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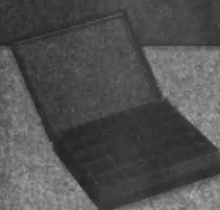
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Some Fundamentals in Tuberculosis Prevention

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TO the student of tuberculosis there would appear to be conflicting opinions in the minds of those directing anti-tuberculosis campaigns in different countries and states in recent years. This confusion is more apparent than real, and arises from the fact that different countries are featuring different majors while pursuing a general program.

England, in protecting herself against the germ, stresses, beyond all other countries, the increase of non-specific general resistance, and features better living, slum clearance, etc. France, on the other hand, features development of specific resistance by vaccination; while Canada and the United States have a growing tendency to lay stress upon elimination of the germ by eradication of bovine tuberculosis; by segregating human cases in institutions for treatment, and by closing open lesions whenever possible.

For health and tuberculosis workers at this time nothing could be more constructive than some thread of knowledge that would lead to a better understanding of the values and limitations of these methods of control. With this in mind let us consider the principal objectives of the present anti-tuberculosis program.

NON-SPECIFIC RESISTANCE

Non-specific resistance is very important in this disease which incubates in months and runs its course in years because of its chronicity.

The earliest effort in anti-tuberculosis campaigning was to educate the public regarding the necessity for high standards of living in order that resistance against the disease might be increased.

The importance of general resistance was well established before tuberculosis was known to be a germ disease. Widespread tuberculosis was found associated with poverty, while it was seen that better living conditions provided some measure of protection.

Those who have cared for patients in sanatoria know what a wonderful benefaction a high standard of living can confer upon the tuberculous sick. Good food, good housing, rest and fresh air, have restored thousands of sanatorium patients from sickness to health.

Therefore, in a state or community where the disease is endemic; where the great majority reacts positively to tuberculin; and where the tuberculosis death rate is high, a good standard of living is excellent general treatment. It is simply applying to a community, in a modified way, the same principle that is relied on in the best sanatoria. When we consider what can be accomplished in an institution by good living principles, it is not remarkable that excellent results have been secured by their application to the community and state.

However, this living-standard method of combating tuberculosis has its limitations; it does not prevent infection. Although it affords added protection for the more resistant members and prevents many small infections from developing into disease, nevertheless it gives inadequate protection to the non-resistant in the community, and cannot protect even the resistant against large and frequent doses of infection.

These limitations are observed when children and young adults in the best of homes, with the highest living standards, are exposed to massive infection from an unrecognized open case. Tuberculosis is not confined to the poor nor to the underdeveloped.

Notwithstanding the place that increasing non-specific resistance has played in the control of tuberculosis where the tuberculosis death rate is high, this feature, in areas where the tuberculosis death rate is low, and infection no longer inevitable, is giving place to more direct measures aimed at the infectious nature of the disease. The former method is giving ground to the latter, first, because we believe that tuberculosis is simply an infectious disease; second, because we believe that infection with this disease in the next generation will no longer be inevitable; and third, because we think that tuberculosis is one infectious disease that can be controlled by epidemiological measures.

SANITATION

Ever since the discovery of the germ of tuberculosis the anti-tuberculosis program has also stressed sanitary education. We see anti-spitting signs in trains and other public places. Public health education has continuously featured the importance of sanitation in the prevention of tuberculosis. Undoubtedly infection has been reduced by keeping floors clean, by sterilization of dishes, and by installation of sewage and plumbing in communities and homes.

Good habits and sanitary personal technique reduce the dose and frequency of infection for contacts, and in consequence the proportion of the population

which will break down in the presence of a high standard of sanitation is reduced. The value of sanitary technique is demonstrated in hospitals where infectious diseases are cared for. Similarly, its value in a province or community where tuberculosis is endemic is obvious.

Nevertheless, the protection conferred by sanitary habits is, in a practical way, also limited. This is best illustrated by the case of nurses-in-training, who may be considered amateurs in the practice of sanitary technique. Today most of the probationers entering our general hospitals do not react to tuberculin. They have excellent living quarters and good food, and they receive special training in sanitary technique. Yet periodic tuberculin tests tell the tale of implantation of infection after entering hospitals. A certain percentage of these non-reactors will react positively within a year, and the proportion increases steadily throughout training. Periodic radiographs show that an undue percentage develops tuberculous lesions. In fact, the incidence of breakdowns is second only to that of contacts in a tuberculous home. Protection by sanitary technique is acquired after long and intensive practice; is maintained at the price of eternal vigilance, and is subject to human error; it is by no means absolute.

It follows that a method of defence which gives imperfect protection to specially trained nurses must be much less effective in the protection of the general public whose knowledge and practice of technique are, after all, limited.

It would seem, therefore, as far as the general population is concerned, that the control of an infectious disease that does not burn itself out, failing the use of a specific prophylactic, must ultimately depend upon the control of the source of infection. We must concentrate attention upon the infectious host.

ELIMINATION OF INFECTION

The modern sanatorium movement, which has bestowed an invaluable blessing on the state and community by restoring tuberculous sick to health, has perhaps incidentally given us the key to the ultimate control and eradication of the disease. By careful observation of the incidence of death rate and infection in communities where a large proportion of active cases is treated in institutions, we have discovered that infection is falling much faster in recent years than is mortality. This would seem to indicate that the greatest benefit conferred by sanatoria is not the lowering of death rate by their cures, but is the lowering of infection rate by segregation and isolation. It suggests that tuberculosis, like the chronic disease leprosy, will eventually be eradicated by control of infection.

It is true that but little progress has been made in the control of acute infectious diseases for which we have no prophylactic, such as measles and whooping cough, but our experience with tuberculosis has been entirely different. Rapid progress is being made in its control wherever isolation is being applied.

Pulmonary tuberculosis, like measles, belongs to that group of diseases transmitted from person to person, largely by respiratory infection. Isolation, as a means of controlling acute diseases spread in this manner, has been very disappointing; but in the case of tuberculosis it has been very encouraging.

Examination of Normal School students in Saskatchewan in 1921, and again in 1936, shows that there has been no decrease in the proportion which has suffered from measles, but that the incidence of tuberculosis infection has fallen from 75 per cent. to 15 per cent.

This experience would not be convincing if it did not obtain in congested centres of population. In the city of Saskatoon the testing of a cross-section of school children has shown that the incidence has fallen from 53 per cent. in 1921 to 14 per cent. in 1934; and to 7 per cent. in Moose Jaw and Weyburn in 1937. Our experience in schools of the Qu'Appelle Indian Health Unit has been the same. In the two Indian boarding schools in this unit the average incidence of infection has been reduced from 92 per cent. in 1926 to 49.5 per cent. in 1934 by removal of lesion cases; whereas in eight Indian boarding schools throughout Saskatchewan where segregation has not been instituted the incidence of infection in 1934 was 79 per cent. Removal of lesion cases has therefore succeeded in reducing infection rapidly even among primitive Indian school children concentrated in boarding schools.

There are certain important differences between tuberculosis and other respiratory diseases which make it more responsive to isolation. Acute respiratory diseases are almost always accompanied by infectious rhinitis and sore throat, and such cases are without exception infectious. On the other hand, in 75 per cent. or more of persons who become infected with tuberculosis there is a small area of the lung affected which resolves without rupturing to the surface and becoming infectious. Moreover, acute respiratory diseases depend for their spread on many cases being infectious for a short period, whereas tuberculosis depends upon a few cases being infectious for a long period. Tuberculosis is a more slowly developing infection. There is much more time to isolate before its seeds are shed.

With the aid of education and modern facilities for diagnosis this disease can be diagnosed early enough, and isolated early enough, to reduce the spread of infection so rapidly as to convince us that it can be controlled and practically eradicated.

ISOLATION

The method now most effective for the elimination of human tuberculosis is isolation. The first necessity for such a program is ample bed accommodation. The next requisite is the removal of financial barriers to treatment without flavor of charity. The third essential is that the most efficient treatment procurable is provided for all, and finally that treatment institutions be sufficiently comfortable and homelike to be acceptable to patients for indefinite periods.

We must not be carried away by enthusiasm to think that every case can be closed by treatment. Closure by rest and hygienic treatment is effective in many cases, and closure by pneumothorax, assisted by pneumonolysis, is satisfactory for a large group. Surgical closure of cavities is satisfactory as far as it goes, but we find that little more than half the thoracoplastic collapses are completely

satisfactory in eliminating germs. In spite of our present-day program, our excellent institutions, our highly trained staff, and our making use of effective medical and surgical measures, 15 per cent. of our patients are discharged with positive sputa so that this effort is also limited.

The reduction of infection by isolation of spreaders, however encouraging, should not lead us to neglect or abandon the supporting measures such as maintaining general resistance by a high standard of living and improving protection by better sanitation. These measures have stood us well in treating the tuberculized community and nation in the past, and have reduced the tuberculosis death rate in the preceding generation. On the other hand, the more rapid response to isolation should convince us of the inadequacy of these former methods alone, and the necessity of advancing boldly to the segregation plan for treatment and prevention, which has proved most effective and which appears adequate to reduce the disease to a minor cause of death.

VACCINATION

Notwithstanding the success that is attending our anti-tuberculosis campaign directed towards elimination of the infecting germ by isolation, there is no reason why we should close our eyes to a prophylactic that will increase specific resistance, even though this resistance may be limited. Experience with B.C.G. vaccine in Europe and in Quebec has established the fact that this vaccine is safe, and their reports indicate that it appreciably reduces the death rate among the vaccinated infants in contact with positive sputa cases in comparison with non-vaccinated controls. Any assistance that could be secured from even a relatively successful prophylactic would be of great assistance in the present campaign in protecting those unavoidably and continuously exposed (1).

The experiments of Heimbeck with allergic and non-allergic nurses suggests the need of investigating the incidence of breakdown in the positively and non-reacting nurses in Canadian hospitals and sanatoria to determine in a sufficiently large group the efficacy of the resistance which accompanies allergy.

There is little excuse for the uncertainty which surrounds this condition when the use of tuberculin in the staffs of hospitals and sanatoria could, in a few years, settle this important question. The Province of Ontario is to be commended for the action they have taken by legislation providing for this test.

NEED OF EPIDEMIOLOGICAL STUDIES

At this point I wish to hesitate a moment in order to emphasize a few epidemiological trends. The first is the need of epidemiological surveys of the areas under control. It has been emphasized masterfully by Kendall Emerson and others that future anti-tuberculosis programs must be selective, and must concentrate on known tuberculized groups.

To stress the relative importance of tuberculized groups, let us summarize the proportion per thousand of patients admitted during the past three years from the various groups dealt with in Saskatchewan:

| | | |
|---|-------|------------------------------|
| (1) From the general population less than | 1 | case admitted per 1,000 |
| (2) From the Normal School group | 1.5 | cases " " " |
| (3) From nurses-in-training | 9 | " " " " |
| (4) From survey of half-breed community | 10 | " " " " |
| (5) From survey of mental hospital patients | 52.5 | " " " " |
| (6) From Indian school children | 45.0 | " found to have tuberculosis |
| (7) From family contacts | 50.0 | " " " " |
| (8) From suspects referred by physicians | 100.0 | " " " " |

Due consideration of tubercularized groups involves continuous epidemiological study in the area under control. The findings of these epidemiological surveys provide the reorganizing stimuli for a campaign. They result in the discarding of less effective methods and the instituting of new ones in accordance with discovered trends. Like the Intelligence Corps in an Army they determine the strength of the enemy, the location of concentration or weaknesses, and provide information for a plan of attack.

EPIDEMIOLOGICAL METHOD OF CASE-FINDING

Second only to the family physician and his familiarity with the symptom complex is the anti-tuberculosis organization and its facilities for examination of the contacts to every primary case discovered by the physician.

These contacts form "the pre-tuberculous group" which we have long overlooked. Like the Holy Grail, they were too near and common to be recognized. Moreover the long sought test for identifying the infected individuals in this pre-tuberculous group is the tuberculin test, and it is a test that is sensitive enough to be used as a criterion both for exclusion and inclusion of suspects with tuberculosis-like symptoms for further study.

The epidemiological method of controlling the disease is a distinct advance, and in recent years it has been stressed more and more in the anti-tuberculosis program. Great credit is due Hill, Opie, McPhedran, Cox, Stewart, Myers and others, for the emphasis they have placed upon it.

This method, too, is beset with difficulties. The chronicity of the disease accounts for difficulties which arise in following the trail of the tuberculous to their primary infector. A study of one thousand adult cases by Molony in 1924, 70 per cent. of which were advanced, showed the average period between earliest symptoms of disease and date of breakdown to be $2\frac{1}{4}$ years (2). A study of the period elapsing between the breakdown of the primary case and the breakdown of the secondary case, as found by the Cattaraugus County group, showed a concentration within the first two years, but no evidence of saturation for a period up to ten years (3).

Furthermore, a study by Jessell in Lancashire in 1930 showed that 15 per cent. of new cases of tuberculosis found were secondary cases occurring after exposure to known primary cases (4). On making a survey of patients under treatment in Saskatchewan in 1936 Dr. Boughton found that 25 per cent. were contacts to known primary cases; that an additional 10.7 per cent. were contacts to tuberculous cases unknown to the League; and that 63.4 per cent. had no knowledge of contact.

These facts alone separate tuberculosis widely from acute rapidly developing infectious diseases which are commonly trailed by the epidemiologist, and where a history of contact can be obtained in practically every case.

The epidemiological approach as a method of discovering new cases of tuberculosis has established itself only as second best compared to the clinical approach of the family physician. Its limitations in a rounded tuberculosis campaign will be appreciated when I tell you that among 525 new active cases discovered in 1935, only 133, or 25.3 per cent., were discovered by a purely epidemiological hunt, *i.e.* by the examination of contacts, although 4.7 contacts were examined for each primary case discovered.

From this you will realize that the epidemiological method of case-finding in this chronic disease, tuberculosis, has its limitations. It should be worked for all it is worth, but it does not constitute a full tuberculosis program. It does, however, bring in many silent, early cases. The advantages of this effort are that it is simple and definite; that it yields reasonable results; and that it is well within the financial scope of any anti-tuberculosis program.

MORE CAREFUL SIFTING OF CONTACTS AND SUSPECTS

Not only should the anti-tuberculosis effort concentrate more and more on tuberculized groups, but suspects and contacts should be sifted very carefully before they are referred to the clinic or sanatorium.

In rural areas, at least, the clearing up of infection depends largely upon the interest and energy of the family physician who selects the suspects for further investigation (5).

As the people become tuberculosis-conscious, more and more of them come to their family physicians with less and less definite symptoms, and the necessity for a method of excluding doubtful cases becomes greater.

As the incidence of infection falls, the effectiveness of tuberculin as a method of exclusion becomes greater. In areas where the incidence of infection in school children is less than 10 per cent., and where in the young adults, who constitute the highest proportion of new cases, it is less than 20 per cent., tuberculin, as a means of exclusion, becomes decidedly practical.

Therefore, where the incidence of infection is low, and where the people are tuberculosis-conscious, the next step in the anti-tuberculosis campaign appears to be the supplying of free tuberculin to the family physician, and his familiarization in its use as an aid in case selection. The use of tuberculin for selection will eliminate the waste of referring to clinics those patients with tuberculosis-like respiratory complexes who are not even infected with tuberculosis, and it will eliminate non-infected contacts.

Unidentified Spreaders

The greatest difficulty in clearing up a chronic epidemic disease such as tuberculosis arises from the fact that an infectious person with good tolerance and a stationary lesion may spread the disease for years, even a decade, before

falling sick or recovering to the extent of closing the lesion. These unidentified spreaders, giving rise to infection of unknown origin, appear to account for more than half the new patients admitted to sanatoria, even where an advanced program is applied. A study by Molony in 1924 showed that only 30 per cent. of one thousand adult cases treated in Saskatchewan had a history of a case of tuberculosis in their family. A check on the patients in one of our sanatoria five years later showed the proportion to be even lower.

How to identify the near-well, chronic spreader, infectious, but not sick enough to report to a doctor, is the difficult problem in tuberculosis epidemiology.

One simple suggestion towards its solution is a more general use of sputum examination by the family physician. Approximately half the patients referred to our sanatoria for treatment have positive sputa on admission. A stamped, addressed, ready-to-mail sputum container, supplied by the anti-tuberculosis organization, if carried in the physician's medicine bag, can be handed to any chronic cougher consulting him or accidentally met in families where he is called.

It is not too much to expect that the family physician should take the responsibility of having the sputum of chronic coughers in his practice examined for tubercle bacilli. There is perhaps no case-finding procedure a physician can follow which will yield higher returns for the same effort. There is no expenditure an anti-tuberculosis organization can make that will bring better returns than supplying these ready-to-mail specimen bottles to family physicians. Sputum examination of chronic coughers would succeed in measurably reducing infection from now unidentified spreaders.

FOLLOW-UP OF EX-PATIENTS

A matter of great importance in the eradication of a chronic disease such as tuberculosis is the follow-up examination of previously treated patients. There are more than four thousand ex-patients living in our province who have been treated in our sanatoria. Amongst this group there is an average of forty-six relapses a year. These relapses occur in patients who had attained the arrested stage of disease, and were known to be bacillary-free for a considerable period. A high rate of relapse in the inactive, and progression to fatality in the unimproved, is the nature of this disease.

In Saskatchewan during the past five years the number of active cases admitted among ex-patients has been slightly greater than the number of lesion cases found among contacts to primary cases discovered, being 860 compared with 760. Re-examination of ex-patients has proved to be a very important measure for discovery and control of spreaders.

Consequently no program of eradication is complete which does not give due consideration to the re-examination of all ex-patients for an average period of five years after discharge. This re-examination is not only for the purpose of advising them and assisting them to attain the greatest possible degree of recovery, but is also for the purpose of picking out cases which become active

and infectious, and which require further treatment for recovery, and segregation for prevention of infection.

CASE REGISTRATION

It will be evident to you that neither ex-patients nor contacts can be systematically followed up without case registration. These two activities are inseparably connected, sometimes one preceding, sometimes the other. The greatest flaw in the armour of anti-tuberculosis work today is failure to accomplish adequate case registration. The best method of securing it is to start with: (a) treated patients; (b) primary cases referred by physicians; (c) death certificates of untreated cases. Then follow-up and register all contacts to these three groups.

Registration is facilitated by legislation requiring reporting, but it cannot be achieved by this alone.

End results of registration will be secured and maintained only by an active follow-up service which provides advice, examination, and treatment if necessary, for patients and their contacts. Registration as a statistical effort alone will fail. Follow-up and segregation for the purpose of giving service to the sick and exposed will succeed.

TUBERCULOSIS-CONSCIOUSNESS

In conclusion I wish to say a word or two about a fundamental of the anti-tuberculosis program upon which in the end the effectiveness of all other tuberculosis activities depends, that is, the tuberculosis-consciousness of the people. Until periodic general health examination of the people is established, which, however desirable, is too costly to be established for the tuberculosis benefit alone, the ailing individual, the suspect, contracting tuberculosis from an unknown source, must initiate the first step and come to the doctor.

When will he come? If he comes only on falling sick, the great majority will come in an advanced stage of disease. If he comes on suspicion of early symptoms, a large proportion will come in the early stage. How can he come on suspicion unless he has been taught to suspect tuberculosis? The tuberculosis-consciousness of the average individual in the community determines the earliness with which he will consult the family physician regarding suspicion of tuberculosis. Consequently under the present relationship of doctor and patient the key to early diagnosis depends largely upon the extent to which the average individual is tuberculosis-prevention-conscious. Granted that this consciousness is a fundamental in the eradication of tuberculosis, how is it to be established in a province-wide program?

It is true that health officers, health nurses, family physicians, the clergy, ex-patients, the radio and the press can accomplish a great deal, and that the health department, or its accepted anti-tuberculosis organization, should have the responsibility of guiding the educational campaign. But is it reasonable to leave to this small group a teaching responsibility which could be shared with many thousands of fully trained teachers?

Our method of educating the people today is largely through the medium of the public school where trained teachers instruct our children in such knowledge as will render them intelligent citizens. In our present social organization there is no better way of quickly establishing a consciousness of tuberculosis among the young people than through their schools. The school period is most opportune since the incidence of this disease rises after leaving school and reaches a maximum within a period of ten years.

There appears no reason why health cannot be taught in school as successfully as can the three R's. If tuberculosis-consciousness on the part of the individual is essential to eradication of this insidious disease, then why not let us take the matter seriously? Having made the teaching profession tuberculosis-conscious by examination and instruction of Normal School students, let us ask them to make our entire school population prevention-of-tuberculosis-conscious at the very threshold of their greatest danger period. This is a method of thoroughly and timely disseminating education which is now being scattered sparsely by our health organizations.

In conclusion, I would summarize the epidemiological status of this disease as follows: Tuberculosis is an infectious disease that will not burn itself out by developing specific resistance. It will, however, burn itself down from plague proportions to that of a major cause of death. There it remains and has remained in the ancient civilizations about the Mediterranean for more than two thousand years.

But in a tuberculosis-conscious community, with modern facilities for diagnosis, it is an infectious disease that can be diagnosed early enough and isolated early enough to reduce the spread of infection so rapidly as to convince us that it can be controlled and eventually reduced to a very minor cause of death.

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A Survey of the Incidence of Venereal Diseases in Ottawa, Canada, November 1937

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THE following is a report of a survey of the incidence of venereal diseases in Ottawa, Canada, made in November 1937. This survey was made possible by the co-operation of the Ottawa Medico-Chirurgical Society and the Ottawa Branch of the Health League of Canada. It is the first survey of this kind made under the auspices of these two organizations, so that no comparison with the results of previous surveys can be made. A similar survey was made in Toronto during 1937 and comparisons may be made with the results reported by Dr. Gordon Bates in the December 1937 issue of this journal.

Two hundred and forty-six letters and questionnaires were sent to practising physicians and clinics asking for information regarding cases of venereal disease under treatment in November 1937. Of these, only one doctor refused to reply and three doctors promised to report but failed to do so. Two hundred and forty-two reports (98.4 per cent.) were received. This response was very gratifying and bears comparison with the Toronto figure of 97 per cent. Three clinics reported.

Of the 239 physicians who returned their questionnaires, 82 (34.3 per cent.) were treating one or more cases. A total of 1,621 cases of venereal diseases was reported. This works out, roughly speaking, at one case of venereal disease in every hundred Ottawa people—men, women, and children.

Table I shows the distribution of cases, by diseases, treated by physicians and clinics. It will be seen that more cases are treated by clinics than by physicians in both diseases.

TABLE I
SYPHILIS AND GONORRHOEA TREATED BY PHYSICIANS AND CLINICS

| | <i>Syphilis</i> | | <i>Gonorrhoea</i> | |
|-------------------------|-----------------|-----------|-------------------|-----------|
| | Number Treated | Per cent. | Number Treated | Per cent. |
| Private physicians..... | 254 | 25 | 239 | 41 |
| Clinics..... | 779 | 75 | 349 | 59 |
| TOTAL..... | 1,033 | 100 | 588 | 100 |

Supplementing the data of table I, table II presents the percentage of cases treated by physicians and clinics according to the stage of disease. Stress is properly laid on the time that treatment is commenced. It is helpful to study the cases from this standpoint as treated by private physicians and in clinics.

TABLE II
PERCENTAGE TREATED BY PHYSICIANS AND CLINICS BY STAGE OF DISEASE

| Treated by | Syphilis | | | | | Gonorrhoea | | | | |
|----------------------|-------------|-------------|------|------------|------|-------------|-------------|------|------------|------|
| | Total Cases | Early Cases | % | Late Cases | % | Total Cases | Early Cases | % | Late Cases | % |
| Private physicians.. | 254 | 36 | 19.5 | 218 | 25.7 | 239 | 110 | 35.3 | 129 | 46.7 |
| Clinics..... | 779 | 149 | 80.5 | 630 | 74.3 | 349 | 202 | 64.7 | 147 | 53.3 |

These figures make an interesting comparison with similar figures in the Toronto report. In Toronto, a much larger percentage of early cases of both diseases is treated by private physicians: 64 per cent. for syphilis as compared with 19.5 per cent. in Ottawa, and 62 per cent. for gonorrhoea as compared with 35.3 per cent. for Ottawa. The incidence of both diseases with a rate of 9.95 per 1,000 for 1,621 cases, with rates of 6.45 and 3.61 for syphilis and gonorrhoea, respectively, also makes an interesting comparison with similar rates for Toronto: for syphilis, 5.64; gonorrhoea, 3.95; and for both diseases, 9.59 per 1,000 population.

It is of interest also to review the findings in regard to age and sex. In table III cases of syphilis and gonorrhoea are presented in two age-groups, under 14 years and over 14 years, and by sex.

TABLE III
SYPHILIS AND GONORRHOEA BY AGE AND SEX

| Age | Syphilis | | | | Gonorrhoea | | | |
|---------------|----------|--------|-------|-------|------------|--------|-------|-------|
| | Male | Female | Total | % | Male | Female | Total | % |
| Under 14..... | 23 | 33 | 56 | 5.4 | 19 | 15 | 34 | 5.8 |
| Over 14..... | 454 | 523 | 977 | 94.6 | 412 | 142 | 554 | 94.2 |
| TOTAL..... | 477 | 556 | 1,033 | 100.0 | 431 | 157 | 588 | 100.0 |

A further classification according to the stage of disease is helpful in analysing the data of this survey. In table IV the cases of syphilis and gonorrhoea are considered as early and late cases in two age-groups and according to sex. The total number in each group is expressed as a percentage of the total number of cases of syphilis and gonorrhoea, respectively.

The survey indicates that only 18 per cent. of the cases of syphilis were early cases. This is in contrast to gonorrhoea, where 53 per cent. of the cases were seen early.

DISCUSSION

Private physicians are responsible for the treatment of only one-third of the cases of syphilis, although a larger percentage of cases of gonorrhoea are treated by them. In Toronto the same percentage of cases of syphilis was treated by physicians and 48 per cent. of the cases of gonorrhoea, in contrast with 41 per cent. in the Ottawa survey. A larger number of early cases of gonorrhoea is

TABLE IV
SYPHILIS AND GONORRHOEA BY AGE, SEX AND STAGE OF DISEASE

| Syphilis | | | | | Gonorrhoea | | | | |
|------------|------|--------|-------|---------------------|------------|--------|-------|-----------------------|--|
| Early | | | | | Early | | | | |
| | Male | Female | Total | % of total syphilis | Male | Female | Total | % of total gonorrhoea | |
| Under 14.. | 6 | 3 | 9 | .87 | 13 | 12 | 25 | 4.25 | |
| Over 14... | 94 | 82 | 176 | 17.04 | 243 | 44 | 287 | 48.81 | |
| TOTAL.. | 100 | 85 | 185 | 17.91 | 256 | 56 | 312 | 53.06 | |
| Late | | | | | Late | | | | |
| Under 14.. | 17 | 30 | 47 | 4.55 | 6 | 3 | 9 | 1.53 | |
| Over 14... | 360 | 441 | 801 | 77.54 | 169 | 98 | 267 | 45.41 | |
| TOTAL.. | 377 | 471 | 848 | 82.09 | 175 | 101 | 276 | 46.94 | |

treated by private physicians than by clinics but in the case of syphilis a somewhat higher percentage of early cases was treated by the clinics. In Toronto the reverse was found to be true, the proportion being almost two to one. Eighty-two per cent. of the cases of syphilis seen were late cases, in contrast to 90 per cent. in the Toronto survey, implying that early cases are possibly seeking treatment more promptly. Similarly, 47 per cent. of the cases of gonorrhoea were considered late cases in contrast to more than 60 per cent. in Toronto.

SUMMARY

The total number of cases of syphilis and gonorrhoea reported in this survey in the city of Ottawa in November, 1937, was 1,621. The population of the city is recorded as 162,890. The rate of incidence of these two diseases was 9.95 per thousand. There were 1,033 cases of syphilis and 588 cases of gonorrhoea—rates of 6.34 and 3.61, respectively, per thousand population. Of the syphilis cases, 556 were females and 477 males in contrast to the Toronto data, where 2,075 were males and 1,564 were females.

Comparing the findings with the most recent survey in Toronto, the survey of June 1937, the incidence rate for both diseases was practically the same as for Toronto, which was 9.59 per thousand. The syphilis rate of 6.34 for Ottawa was higher than the rate in the Toronto survey, 5.64, and the gonorrhoea rate was slightly lower than the Toronto rate of 3.95, being 3.61.

Notes on the Early History and Evolution of the Department of Health of Montreal*

EUGENE GAGNON, M.D.

*Superintendent, Division of Demography
Department of Health, Montreal, Quebec*

SIXTY-FIVE years is more than the average span of human life but it is a very short period in the life of a public institution. On the foundations laid during the early years Montreal has built a highly effective department of health that takes its place among the leading health departments of this continent. It is primarily engaged in the prevention of disease. The provision for treatment of contagious diseases, tuberculosis and cancer is made by hospitals and institutions receiving subsidies from the city. The work of the Department of Health is conducted by eight divisions, which include Contagious Diseases and Epidemiology, Child Hygiene, Sanitation, Food Control, Laboratories, Vital Statistics, Medical Service, and Municipal Assistance. A staff of more than 350 persons is engaged in the work of the Department, including 45 physicians, 6 dentists, 10 veterinary surgeons, 2 sanitary engineers, 123 nurses and 78 inspectors. The extent of the Department's responsibilities is reflected in the annual disbursement of more than \$3,500,000, of which approximately \$2,500,000 is expended by the Division of Municipal Assistance as relating to public charities (excluding unemployment relief). The expenditures mentioned above include expenditures in connection with the hospitalization of contagious diseases and tuberculosis.

THE BEGINNINGS OF THE DEPARTMENT

Until 1870 the only efforts made in health matters related to the control of nuisances. A certain number of regular policemen gave attention to the cleaning of yards, lanes, and privy-pits. At the time of epidemics, the Council established a Health Committee, but the Committee had very limited powers. Later this became the Board of Health but little importance was given to the appointment of health officers. Doctors Larocque and Dugdale, who served jointly as health officers in 1870, were not asked to assist in the meetings of the Board and had no office in the City Hall. In 1871, however, Justice Coursol, recently appointed Mayor, provided an office for the medical officers and to this office the sanitary police officers made daily reports and received instructions.

In 1872 mortality statistics for the city were compiled and the responsibilities

*Abstract of a paper presented before the Section of Vital Statistics and Epidemiology at the twenty-sixth annual meeting of the Canadian Public Health Association, Ottawa, June, 1937.

of the medical officership were assumed by Dr. A. B. Larocque, who continued to serve until 1885. It is interesting to record the vital statistics of the year 1872, the first recorded. The population of the city was 120,000 and there were recorded 4,500 deaths, a rate of 37.4 per 1,000 population. The chief causes of death for the five-year period 1872-1877 are presented in table I.

TABLE I
THE CHIEF CAUSES OF DEATH, MONTREAL, 1827-1877

| Cause of death | Total No. (5 years) | Mean per year | Rate per 1,000 population |
|-------------------------|------------------------|------------------|------------------------------|
| Smallpox..... | 2,918 | 583.6 | 4.4 |
| Measles..... | 137 | 27.4 | 0.2 |
| Scarlatina..... | 323 | 64.6 | 0.5 |
| Diphtheria..... | 797 | 159.4 | 1.2 |
| Typhoid fever..... | 431 | 86.2 | 0.7 |
| Dysentery..... | 157 | 31.4 | 0.2 |
| Diarrhoea..... | 1,381 | 276.2 | 2.1 |
| Cholera infantile..... | 931 | 186.2 | 1.4 |
| Teething..... | 522 | 104.4 | 0.8 |
| Infantile debility..... | 2,054 | 410.8 | 3.1 |
| Pthisis..... | 2,014 | 402.8 | 3.2 |
| Total 11 causes..... | 11,665 | 2333.0 | 17.5 |
| Other causes..... | 9,758 | 1951.6 | 14.2 |
| GRAND TOTAL..... | 21,423 | 4284.6 | 32.1 |

However, very little progress was made until 1876, when Dr. William Hingston was elected Mayor. The Board of Health was reorganized. Mortality statistics were improved and classified according to the List of Causes of Death adopted in England. At this time also a sanitary bulletin was published monthly and a map of the city indicating where disease was prevalent was prepared. Even in 1878, however, the City Council's lack of interest in the Board of Health is indicated by the delay of seven months in nominating a board and obtaining a chairman from among the aldermen. The Medical Officer of Health was obliged to fight for the recognition of his authority in health matters and to be permitted to distribute more effectively the work among the members of the staff. He had to claim for himself the power to decide "whether a thing is a detriment to public health or not", as apparently this right had been denied to him. The work of the Medical Officer of Health was handicapped by the absence of Provincial health laws such as related to the control of communicable diseases.

It is interesting to review the measures that Dr. Larocque urged at that time, since to-day they are recognized as essentials in an effective health department. He urged the compulsory notification of smallpox, diphtheria, and typhoid fever, and the isolation of patients in their home whenever possible, with hospitalization when proper isolation could not be obtained. He stressed the absolute necessity of vaccination against smallpox, urging that vaccination be made compulsory. To facilitate the vaccination of the population, he had divided the city into four districts, and four public vaccinators were appointed

in 1879. He was conscious of the need for the health supervision of food products. To this end he urged the inspection of dairies and dairy farms, the abolition of private slaughter houses, the construction of public abattoirs in which inspection of meat could be conducted and, finally, inspection of foods in retail stores. Although the water supply of Montreal at that time was considered satisfactory, he recommended the filtration of the municipal supply as a precautionary measure. These recommendations were contained in the report of 1879, the first report that is available in the Department. This was the fifth annual report of Dr. Larocque but it would appear to be the first in which the details of the organization are given. He also outlined briefly the history of the Department. When it is remembered that these recommendations relating to the control of communicable diseases were made before the germ theory of disease was introduced, before the era of the discovery of the typhoid bacillus, the diphtheria bacillus, and the bacillus of tuberculosis, the foresight of this pioneer health officer is more fully appreciated.

THE SMALLPOX EPIDEMIC OF 1885

From 1870 to 1879 smallpox was prevalent in the city of Montreal. In 1872, 897 deaths were recorded from this disease and in 1879, 472 deaths. In the latter year an intensive vaccination campaign was conducted, following the appointment of four public vaccinators. These physicians were employed for three hours a day and were paid \$25.00 a month.

The effort of Dr. Larocque to control smallpox appeared to be effective, as indicated in his report for the year 1884, in which he stated: "In 1880 there were 140 deaths from smallpox and in 1881, only 5. Since then we are happy to say not a single case of smallpox has appeared in the city." Unfortunately this was only the calm preceding a storm because the following year brought the worst smallpox epidemic ever recorded in Canada. The story of that epidemic is of great interest.

The disease was brought to the city by two Pullman conductors travelling between Montreal and Chicago. It was presumed that the malady had been contracted in Chicago, where the disease was prevalent. One developed the disease at home. He was isolated promptly and subsequently only one contact case was reported. Both this patient and the contact patient recovered. The other Pullman conductor became sick on the train. As he had no home in Montreal, he was sent by the physician of the railroad company to one of the public hospitals on February 28th. The health authorities were not informed of this case. The disease spread rapidly among the patients of the hospital and from there to the community. Stringent measures were applied and vaccination of the entire population was urged. Unfortunately, this was opposed by many, since a number of persons had developed complications of an erysipelatous nature following vaccination. As a result, a great part of the population remained unvaccinated.

By the end of June, very few cases were reported and the epidemic seemed to be well under control. Soon afterward, following a large public gathering, the

disease reappeared and again became epidemic. Vaccination and revaccination of all persons who had not recently been vaccinated were required immediately and the persons were isolated in their homes, the homes being guarded by police officers. Where conditions were unsatisfactory for isolation at home, emergency hospitals were provided. These measures, particularly compulsory hospitalization, were resented by the citizens, and riotous meetings occurred in September, with considerable damage to property. The firmness of the health authorities overcame all the obstacles and by the end of the year the epidemic was definitely ended.

A review of the vital statistics for the year 1885 indicates the ravages of smallpox. The estimated population was 167,000. The registered births numbered 6,303 (37.6 per 1,000 population) and the total deaths 7,825 (46.7 per 1,000 population). The reported smallpox cases totalled 4,771, of which 1,332 were hospitalized. The appalling total of 3,164 deaths (19.2 per 1,000 population) was recorded from smallpox. Of this number, 418 died in hospital, of the 1,332 cases that were admitted. The birth rate in the previous year was 41.3 and the death rate 26.7. An estimate of the cost of the epidemic was recorded in the report as being \$142,835.40.

DR. LOUIS LABERGE AS MEDICAL OFFICER, 1885-1913

In June, 1885, Dr. Louis Laberge was appointed Medical Officer of Health and for the following twenty-eight years directed the Department. At the time of his appointment, the Health Department staff numbered 31, including the Medical Officer of Health, a physician in charge of the Civic Hospital, and 4 physicians serving as district public vaccinators. In addition, there were a chief sanitary inspector and 12 inspectors under his direction, with 4 meat inspectors and 1 in charge of disinfection. The office staff, included in the total, numbered 7. The expenditures of the Department were very modest, amounting to \$17,123.00 in the year 1885, the salary of the Medical Officer of Health being \$1,200.00.

Under Dr. Laberge's direction the Department made gradual progress. The problem of smallpox disappeared after the epidemic, due to the recognition by the public of the value of vaccination and the provisions made for continued vaccination. Only a few sporadic cases have been recorded since 1885, most of the cases originating outside the city. The number of deaths from smallpox is presented in table II in 5-year periods from 1875 to the present, indicating the striking manner in which smallpox has been controlled.

Other communicable diseases were, however, exceedingly prevalent. There was a high death rate from diphtheria and other communicable diseases of childhood and tuberculosis, and the number of deaths of infants was excessive. The City Council, however, did not feel that the public was prepared to support a larger expenditure for health services. As a matter of fact, it is only since the last epidemic of typhoid fever, ten years ago, that the Director of the Depart-

TABLE II
MORTALITY FROM SMALLPOX, MONTREAL, 1875-1936

| <i>Period</i> | <i>Deaths</i> | <i>Period</i> | <i>Deaths</i> |
|---------------|---------------|---------------|---------------|
| 1875-1879 | 2,918 | 1910-1914 | 5 |
| 1880-1884 | 145 | 1915-1919 | 1 |
| 1885-1889 | 3,234 | 1920-1924 | 0 |
| 1890-1894 | 0 | 1925-1929 | 0 |
| 1895-1899 | 14 | 1930-1934 | 0 |
| 1900-1904 | 25 | 1935 | 0 |
| 1905-1909 | 0 | 1936 | 0 |

ment has been given a free hand and the Department received adequate financial support.

The main efforts of Dr. Laberge were directed towards the improvement of sanitary conditions, particularly of the home. A sanitary engineer was appointed as head of the sanitary police and in addition to regular inspections for the suppression of nuisances special attention was given to the elimination of privy pits in the city. In 1891 there were 6,610 privy pits in the old wards of the city and in the municipalities annexed to the city between 1883 and 1910 there were 5,047 more, making a total of 11,657. With the development of the sewerage systems, householders were required to make the necessary sewer connections for their homes, and by the end of 1913 there were only 2,482 houses in which sewer connections had not been made.

Dr. L. Laberge also laid the foundations of the laboratory service by appointing a bacteriologist, Dr. J. Edouard Laberge, and a laboratory diagnostic service and facilities for examinations in the supervision of milk and food supplies were provided. Dr. J. E. Laberge held this position until 1907, when he was appointed director of the Division of Contagious Diseases. The first steps towards the provision of school medical inspection were taken at the same time that the laboratory service was inaugurated. The importance of vital statistics was also recognized and a statistician appointed. The work prior to this date had been conducted by the secretary of the Department.

It is interesting to note that the staff of the Department now numbered 103, in contrast with 31 in 1885. It included 25 physicians, 19 serving as school medical inspectors. The remaining physicians included the Medical Officer of Health, the statistician, the chief of the Contagious Diseases Division, the assistant chief, and two diagnosticians. There were 4 school nurses and 10 inspectors whose duties related to the control of contagious diseases and disinfection. The food inspection work was conducted by a staff of 23 members, 3 of whom were graduates in veterinary science. In sanitary inspection 26 members provided service throughout the city. The laboratory staff consisted of a bacteriologist, a chemist, and an assistant; and the secretarial and clerical staff of the Department numbered 9.

The occurrence of a serious outbreak of typhoid fever in 1909 focused attention on the need for the safeguarding of the water supply by filtration. The water supply was furnished by a private company. Filtration of the supply had been

urged for many years by the Medical Officer of Health. In this outbreak more than 3,000 cases occurred, with more than 300 deaths. The outbreak was due to pollution of the water supply by sewage from the town of Verdun, which discharged its sewage into the river not far from the intake-pipe of the city of Montreal.

DR. SERAPHIM BOUCHER, DIRECTOR OF THE DEPARTMENT OF HEALTH, 1913*

Although much had been accomplished in improving sanitary conditions, typhoid fever and other communicable diseases were still very prevalent and the mortality rate from tuberculosis was excessively high. Little improvement had been made in the infant mortality rate. Dr. Boucher realized the necessity for the development of the Department in such a way that the communicable disease might be more adequately controlled and progress made in reducing the toll of infant deaths. New by-laws had to be passed; dispensaries, hospital and sanatorium accommodation had to be provided; and the interest and support of the public obtained by a campaign of public health education. The years of the Great War rendered more difficult the carrying out of this program but in 1918 the Division of Child Hygiene was organized, providing for the supervision of the child from birth to the end of the school period. Baby-health centres were opened in all the districts of the city not already served by private organizations. An intensive educational program was conducted from these centres, in the schools by physicians, and in the homes by visiting nurses. The importance of safe milk was recognized and a by-law was passed prohibiting the sale of unpasteurized milk, exempting only certified milk produced under special licence. All herds supplying milk to the city were required to be tuberculin-tested and no milk from tuberculin-positive cattle was to be sold.

The occurrence of a serious outbreak of milk-borne typhoid fever in 1927 focused public attention on the need for increased financial support of the Department of Health. Dr. Boucher had continued to urge the necessity of enlarging the staff of the Department and of increasing the budget. To assist in presenting the needs, leading citizens organized the Montreal Anti-tuberculosis and General Health League. Valuable services were rendered and as a result of the wide interest, the Council approved of the making of a survey of the Department by a group of public health experts. Before the close of 1928 the survey had been completed and the recommendations presented. In every way the report substantiated the requests that Dr. Boucher had made. The City Council accepted the recommendations and during the succeeding years the Department has received a greatly increased measure of support which has made possible the carrying out of the major recommendations of the report and the placing of the Department of Health of Montreal in a foremost place.

The accomplishments of the past years under the leadership of Dr. Boucher are shown by the striking reductions in the general death rate, the infant mor-

**Dr. Boucher retired in December, 1937, after twenty-four years of distinguished leadership.*

tality rate, and the number of deaths from diphtheria and other communicable diseases (tables III and IV). In 1928 a city-wide diphtheria-immunization campaign was undertaken, with most gratifying results.

TABLE III
VITAL STATISTICS, MONTREAL
1878, 1884, 1913, 1936

| | 1878 | 1884 | 1913 | 1936 |
|--|---------|---------|---------|---------|
| Population..... | 135,000 | 241,748 | 515,700 | 875,000 |
| Deaths..... | 4,119 | 4,358 | 11,097 | 8,934 |
| Rate per 1,000 population..... | 30.5 | 26.7 | 21.5 | 10.2 |
| Births..... | 6,402 | 6,728 | 20,490 | 16,725 |
| Rate per 1,000 population..... | 47.4 | 41.3 | 39.7 | 19.1 |
| Deaths under 1 year..... | 1,369 | 2,125 | 4,412 | 1,404 |
| Infant mortality rate per 1,000 living births..... | 213.6 | 337.1 | 215.3 | 83.9 |
| Deaths from diarrhoea and enteritis, under 2 years..... | 282 | ? | 2,264 | 184 |
| Rate per 1,000 living births..... | 44.1 | ? | 97.6 | 11.0 |

TABLE IV
MORTALITY RATES OF SPECIFIED COMMUNICABLE DISEASES
FIVE-YEAR AVERAGES, MONTREAL, 1876-1936
(Per 100,000 population)

| | Smallpox | Typhoid | Scarlet Fever | Diphtheria | Pulmonary Tuberculosis |
|----------------|----------|---------|---------------|------------|---------------------------|
| 1876-1880..... | 376.1 | 59.7 | 25.8 | 127.6 | 307.5 |
| 1881-1885..... | 413.1 | 61.9 | 24.7 | 139.4 | 282.7 |
| 1896-1900..... | 1.9 | 26.6 | 24.3 | 71.3 | 266.3 |
| 1911-1915..... | 0.2 | 21.9 | 18.2 | 31.8 | 176.2 |
| 1921-1925..... | — | 8.4 | 11.9 | 20.4 | 119.6 |
| 1931-1935..... | — | 3.3 | 3.7 | 4.6 | 78.4 |
| 1936..... | — | 0.9 | 2.3 | 2.1 | 71.7 |

In considering these data, it must be remembered that the birth rates have declined in a similar proportion to the decline in death rates. Methods of treatment have improved and it is difficult to apportion the share of the various factors contributing to the gratifying decreases in the incidence and mortality of these diseases.

In 1934 the contribution that Dr. Boucher has made to the advancement of public health in Montreal was recognized by the conferring of the honorary degree of LL.D. by McGill University.

In reviewing the progress of the past sixty years, it is seen that all the recommendations made by Dr. Larocque many years ago have been adopted. The mortality from tuberculosis is but a fraction of its early toll. The safeguarding of water and milk supplies has been rewarded by a great saving in life. Certain of the communicable diseases have been controlled with striking success;

namely, those for which specific measures of vaccination have been available. In others, such as measles, German measles, mumps and varicella, little or no reduction in the incidence has occurred. It would appear that our efforts, through reporting, quarantine, and disinfection, have been of little value. Reporting of cases, enabling the health department to provide hospitalization or give supervision if the patient is cared for at home, justifies the requirement of notification. A survey of progress must in fairness include a questioning of the value of such restrictive measures as quarantine in the control of mumps, German measles, and similar diseases. Much effort has been expended during these years in an endeavour to control these common communicable diseases of childhood and, notwithstanding reporting of cases and exclusion from school, the results do not appear to be commensurate with the inconvenience to the public and the amount of work entailed.

Although much has been accomplished, much remains to be done. The successes of the past give great encouragement that the efforts to control these and other communicable diseases will be successful and that further improvements in public health will be made possible.

HOTEL RESERVATIONS IN HALIFAX

THE Local Committee on Arrangements desires to urge that members planning to attend the twenty-seventh annual meeting of the Canadian Public Health Association, which will be held in Halifax on June 20th-22nd in conjunction with the annual meeting of the Nova Scotia Health Officers Association, make hotel reservations at the earliest possible time. Requests for reservations may be addressed to the Chairman of the Hotel Committee, Dr. D. J. MacKenzie, Pathological Building, Morris Street, Halifax. The Lord Nelson Hotel is headquarters for the meeting. Information concerning hotel rates is presented on page 228 of this issue.

A MESSAGE FROM THE HONORARY PRESIDENT OF THE
CANADIAN PUBLIC HEALTH ASSOCIATION



I wish to extend a cordial invitation to the members of the Canadian Public Health Association and the Provincial Association of Medical Health Officers to attend the Public Health Congress, to be held in Halifax beginning June 20th.

With the rapid development in public health activities, and with the inevitable broadening in their scope over a period of years, it is not only desirable, but necessary, that world trends, as well as local trends, be carefully watched. A Congress such as this, embracing as it does members from all over Canada, gives an opportunity, both by formal and informal discussions, to broaden our views and helps us to establish ourselves more firmly on an even keel.

I can assure you a hearty welcome from the citizens of Halifax and of the Province of Nova Scotia.

Frank R. Davis.

Minister of Health.

TWENTY-SEVENTH ANNUAL MEETING CANADIAN PUBLIC HEALTH ASSOCIATION

in conjunction with the Annual Meeting of the

NOVA SCOTIA HEALTH OFFICERS ASSOCIATION

HALIFAX, JUNE 20, 21, 22

Headquarters: LORD NELSON HOTEL

●

THE Local Committee on Arrangements have been highly commended for their success in bringing to the Maritime Provinces the annual meetings of the Canadian Public Health Association and the Canadian Medical Association, and in making possible a medical week in Halifax beginning June 20th. The sessions of the Canadian Public Health Association and the Nova Scotia Health Officers Association will occupy Monday, Tuesday and Wednesday, and on Wednesday morning a joint session will be held with the Canadian Medical Association and the Medical Society of Nova Scotia. The latter associations continue their meetings on Thursday and Friday.

Realizing that many physicians will attend the sessions in preventive medicine on Monday, Tuesday and Wednesday, programs of special interest to them have been prepared. The recent progress in preventive medicine and public health, presented by leaders in these fields in both Canada and the United States, will be reviewed. The headquarters for the sessions in preventive medicine will be the Lord Nelson Hotel, with the exception of Wednesday morning session, which will be held with the Canadian Medical Association in the Nova Scotian Hotel.

PROGRAM FEATURES

In planning the program, the Committee has provided for one session to be devoted to the control of communicable diseases. The results obtained in the prevention of diphtheria and in the control of scarlet fever by active immunization, the investigation of typhoid carriers, and the findings of the 1937 outbreak of poliomyelitis in New Brunswick, will be among the subjects discussed. This program will be of very real interest to the practising physician.

Throughout Canada rapid advances are being made in the control of tuberculosis. In few fields has the progress been so satisfactory as in the control of this disease. The session presenting the advances in tuberculosis control in the Maritime Provinces and in Ontario and Western Canada will be a feature of the meetings. This session, which will be held on Wednesday afternoon, will

deal not only with administrative aspects but will concern the general practitioner's contribution to the program.

More and more it is being recognized that the practitioner of medicine today is vitally concerned with the practice of preventive medicine. It is recognized, too, that in many communities adequate health services cannot be provided because the municipalities concerned are unable to make such provision. Co-operation of municipalities either on a county or group basis makes possible such a plan. On Monday afternoon the session will be devoted to the presentation of the progress in Canada of the provision of such health services through the employment of persons on a full-time basis, reviewing the achievements of the Metropolitan Health Area in Vancouver, the appointment of municipal physicians



DR. P. S. CAMPBELL
Chief Health Officer, Province of Nova
Scotia, and President of the
Canadian Public Health Association



DR. C. E. A. deWITT
of Wolfville, N.S.
President of the Nova Scotia Health
Officers Association

in Saskatchewan and Manitoba, and county or district health units. Dr. Wm. A. McIntosh, of the International Health Division of the Rockefeller Foundation, who is familiar with the progress of this work in the United States as well as in Canada, will speak on the possibilities and limitations of full-time health services. Other speakers at this session will include Dr. Grant Fleming, Dean of the Faculty of Medicine of McGill University; Dr. Jean Gregoire, Deputy Minister of the Ministry of Health, Quebec; Dr. Wm. Warwick, Chief Medical Officer and Registrar-General, New Brunswick; Dr. R. D. Defries, School of Hygiene and Connaught Laboratories, University of Toronto; and Dr. C. J. W. Beckwith, Divisional Medical Health Officer, Nova Scotia. A feature of interest will be the presentation of the awards in the first Rural Health Conservation Contest conducted in Canada. At this session also Dr. P. S. Campbell, Chief Health Officer of Nova Scotia and President of the Canadian Public Health Association, will give his presidential address.

On Wednesday morning practical findings from the serious outbreak of poliomyelitis in Ontario which occurred last year will be presented by Dr. J. T. Phair, Chief Medical Officer of Health, Province of Ontario; Dr. Alan Brown, Physician-in-chief, Hospital for Sick Children, Toronto; and Dr. D. E. Robert-

son, Chief Surgeon, Hospital for Sick Children, Toronto. The Osler Lecture will be delivered by Sir Humphry Rolleston of Surrey, England, who has chosen to speak on "Osler, The Last Phase and His Influence on Medicine".

The work of the Department of National Health, Ottawa, concerns every physician. Three important divisions have been established during the past year



The Lord Nelson Hotel, Headquarters for the Meetings of the Canadian Public Health Association and the Nova Scotia Health Officers Association.

and outlines of the activities of these new branches, as well as a brief review of the other divisions, will be presented in an attractive symposium on Tuesday morning. The work of the new section of Child and Maternal Hygiene will be presented by Dr. Ernest Couture. Dr. R. B. Jenkins, Chief of the Division of Epidemiology, will speak of work already undertaken in Rocky Mountain spotted fever and sylvatic plague in Western Canada; and Dr. F. S. Parney of the problems being undertaken by the Division of Industrial Hygiene. Other speakers participating in the symposium are Dr. C. P. Brown, Chief of the Division of Quarantine; Mr. G. H. Ferguson, Chief Sanitary Engineer; and Dr. J. J. Heagerty.

On Monday a luncheon session is planned at which Dr. J. J. Heagerty, Chief Executive, Assistant, of the Department of Pensions and National Health, will speak. Dr. Heagerty's volumes on Canadian medical history have established him as an outstanding medical historian.

On Tuesday evening the annual dinner of the associations will be held, at which the Honourable Angus L. Macdonald, Premier of Nova Scotia, the Honourable Frank R. Davis, M.D., Minister of Health, and Dr. W. D. Forrest, Chairman of the Board of Health of Halifax, will speak. The presentation of honorary life membership in the Canadian Public Health Association to three outstanding Canadian physicians will be made by Dr. P. S. Campbell.

To the members of the Association and to practising physicians these programs epitomise the progress in preventive medicine and public health.

ENTERTAINMENT

A delightful program of entertainment has been arranged by the Local Committee for the members of the four associations meeting in Halifax during the week. The members of the Canadian Public Health Association and the Nova Scotia Health Officers Association will meet at luncheon on Monday, and in the afternoon the Committee has arranged a tea for the ladies at the Lord Nelson Hotel. On Tuesday morning a drive around the beautiful Dartmouth Lakes to Waverley is scheduled, with refreshments at Green Acres. In the afternoon the ladies are invited to tea at Dr. and Mrs. Mathers' delightful estate at Boulderwood. The annual dinner of both associations will be held on Tuesday evening at the Lord Nelson. On Wednesday morning an interesting motor tour is planned for the ladies and in the afternoon a harbour excursion. There will be a military band on the boat and a buffet supper will be served.

In connection with the meetings of the Canadian Medical Association, the President's reception and ball will be held on Wednesday evening. On Thursday the ladies will lunch at the Ashburn Golf and Country Club; and in the evening the members will be the guests of His Honour the Lieutenant-Governor and Mrs. Irwin at the Government House. There will be golf for the ladies on Friday morning and on Friday afternoon a drive to Silver Sands, with tea at Brightwood.

HOTEL ACCOMMODATION

The Lord Nelson Hotel is headquarters for the meetings of the Canadian Public Health Association and the Nova Scotia Health Officers Association. The hotels and their rates are as follows:

Lord Nelson Hotel. 186 rooms. Single, \$3.00 and \$4.00. Double, \$5.00 and \$6.00.

Nova Scotian Hotel. 160 rooms. Single, from \$3.50. Double, from \$5.00.

Carleton Hotel. 100 rooms. Single, from \$1.50. Double, from \$3.00.

Halifax Hotel. 175 rooms. Single, from \$2.00. Double, from \$3.50.

Queen Hotel. 100 rooms. Single, from \$1.50. Double, from \$2.50.

Preliminary Program

MONDAY MORNING, JUNE 20th

9.00 a.m.—Registration.

It is requested that every member and visitor register. The registration fee for members is one dollar. As all members of the Nova Scotia Health Officers Association are enrolled as members of the Canadian Public Health Association, it is requested that they participate in the arrangements for the convention by paying the registration fee.

9.30 a.m.—*General Session, Canadian Public Health Association and Nova Scotia Health Officers Association.*

Chairman—Dr. C. E. A. deWitt, Medical Officer of Health, Wolfville, and President of the Nova Scotia Health Officers Association.

Milk Supplies in Nova Scotia, with Special Reference to Pasteurization—R. Donald McKay, Sanitary Engineer, Provincial Department of Public Health, Halifax.

Water Supplies of Certain European Countries—Dr. A. E. Blackett, Medical Officer of Health, New Glasgow, N.S.

Food Inspection under the Food and Drugs Act—E. F. Whyte, Ph.D., Dominion Analyst, Federal Food and Drug Laboratory, Halifax.

Some Phases of Drug Control—F. C. Collier, Senior Dominion Analyst, Federal Food and Drug Laboratory, Halifax.

Intermission (ten minutes)

Presidential Address—Dr. C. E. A. deWitt.

Plumbing-borne Diseases—Dr. R. St. J. Macdonald, Department of Public Health and Preventive Medicine, McGill University, Montreal.

The Function of a Hospital in a Public Health Program—Dr. G. A. MacIntosh, Superintendent, Victoria General Hospital, Halifax.

The Key to Health Problems—A. C. Pettipas, Secretary, Board of Health, City of Halifax.

Treatment of Dartmouth Municipal Water for Taste and Odour—Dr. E. I. Glenister, Dartmouth.

Business Meeting, Nova Scotia Health Officers Association.

1.00 p.m.—*Luncheon, both associations.*

Chairman—Dr. Grant Fleming, Dean, Faculty of Medicine, McGill University, Montreal.

Address—Dr. J. J. Heagerty, Chief Executive, Assistant, Health Section, Department of Pensions and National Health, Ottawa.

MONDAY AFTERNOON, JUNE 20th

2.30 p.m.—*General Session, Canadian Public Health Association and Nova Scotia Health Officers Association.*

Chairman—Dr. P. S. Campbell, Chief Health Officer, Province of Nova Scotia, and President of the Canadian Public Health Association.

Presidential Address—Dr. Campbell.

Symposium: Full-Time Health Services

- Possibilities and Limitations of Full-time Health Services—Dr. William A. MacIntosh, International Health Division, The Rockefeller Foundation, New York.
- The Canadian Rural Health Conservation Contest—Dr. Grant Fleming, Dean, Faculty of Medicine, McGill University, Montreal, and Chairman of the Committee on the Rural Health Conservation Contest, Canadian Public Health Association.
- Presentation of the award and diplomas in the 1938 Rural Health Conservation Contest.
- Progress in Full-time Health Services in Canada—Dr. R. D. Defries, School of Hygiene and Connaught Laboratories, University of Toronto.
- The Cape Breton Island Health Unit—Dr. C. J. W. Beckwith, Divisional Medical Health Officer, Department of Public Health of Nova Scotia, Sydney.
- County Health Unit Organization in the Province of Quebec—Dr. Jean Gregoire, Dr. P.H., Deputy Minister, Ministry of Health of Quebec, Quebec.
- Full-time Health Districts in New Brunswick—Dr. Wm. Warwick, Chief Medical Officer and Registrar-General, Province of New Brunswick, Fredericton.

TUESDAY MORNING, JUNE 21st

9.00 a.m.—*General Session, Canadian Public Health Association and Nova Scotia Health Officers Association.*

Chairman—Dr. C. E. A. deWitt, Medical Officer of Health, Wolfville, and President of the Nova Scotia Health Officers Association.

What Can Be Done to Stop the Spread of Communicable Diseases—Dr. J. J. Cameron, Medical Officer of Health, Antigonish, N.S.

Infectious Diseases, Past, Present and Future—Dr. J. K. McLeod, Medical Officer of Health, Sydney, N.S.

Results of Immunization of Nurses against Scarlet Fever—Dr. R. A. H. Mackeen, Provincial Pathologist and Bacteriologist, Department of Health of New Brunswick.

Diphtheria Immunization, with Special Reference to the Local Campaign—Dr. L. M. Morton, Medical Officer of Health, Yarmouth, N.S.

Scarlet Fever in Everyday Practice—Dr. P. E. Belliveau, Medical Officer of Health, Meteghan, Digby County, N.S.

Intermission (ten minutes)

Observations on the Control of Certain Communicable Diseases—Dr. N. E. McKinnon, Connaught Laboratories and School of Hygiene, University of Toronto.

Typhoid Carriers in the Province of Nova Scotia—Dr. J. J. MacRitchie, Divisional Medical Health Officer, Department of Public Health of Nova Scotia; Dr. D. J. MacKenzie, Director, Public Health Laboratory; Dr. Ralph P. Smith, Provincial Pathologist; and Dr. C. W. Taylor, Assistant Provincial Pathologist.

Some Common Industrial Skin Lesions—Dr. H. L. Scammell, Medical Officer, Nova Scotia Workmen's Compensation Board, Halifax.

The Early Diagnosis of Dementia Praecox—Dr. Murray MacKay, Medical Superintendent, Nova Scotia Hospital, Dartmouth.

TUESDAY AFTERNOON, JUNE 21st

2.30 p.m.—*General Session, Canadian Public Health Association and Nova Scotia Health Officers Association.*

Chairman—Dr. P. S. Campbell, Chief Health Officer, Province of Nova Scotia, and President of the Canadian Public Health Association.

Social and Welfare Services of the Department of Public Health of Nova Scotia—E. H. Blois, Director of Child Welfare, Provincial Department of Health, Halifax.

Poliomyelitis in New Brunswick in 1937—Dr. Wm. Warwick, Chief Medical Officer and Registrar General, Department of Health of New Brunswick; Dr. C. W. MacMillan, District Health Officer; and Dr. H. C. Bustin, District Health Officer.

Reducing Infant Mortality—Dr. Ad. Groulx, Director, Department of Health, City of Montreal.

Vaccination against Smallpox—Dr. H. G. Grant and Dr. A. L. McLean, Department of Preventive Medicine, Dalhousie University, Halifax.

The Venereal Disease Problem in Canada—Dr. Gordon Bates, General Director, The Health League of Canada, Toronto.

Intermission (ten minutes)

Symposium—The Health Section of the Department of Pensions and National Health of Canada:

Dr. J. J. Heagerty, Chief Executive, Assistant.

Dr. R. B. Jenkins, Chief, Division of Epidemiology.

Dr. E. Couture, Chief, Division of Maternal and Child Hygiene.

Dr. F. S. Parney, Chief, Division of Industrial Hygiene.

Dr. C. P. Brown, Chief, Quarantine Division.

Mr. G. H. Ferguson, Chief Sanitary Engineer.

TUESDAY EVENING, JUNE 21st

7.30 p.m.—*Annual Dinner, Canadian Public Health Association and the Nova Scotia Health Officers Association.*

Chairman—The Hon. F. R. Davis, M.D., Minister of Health, Province of Nova Scotia, and Honorary President of the Canadian Public Health Association.

Speakers: The Hon. Angus L. Macdonald, Premier of Nova Scotia.

Dr. W. D. Forrest, Chairman of the Board of Health, City of Halifax.

Presentation of honorary life membership in the Canadian Public Health Association, conferred on several distinguished leaders in public health in Canada.

Address—Speaker to be announced.

WEDNESDAY MORNING, JUNE 22nd

9.00 a.m.—*Joint Session of the Canadian Public Health Association and the Nova Scotia Health Officers Association with the Canadian Medical Association and the Medical Society of Nova Scotia.*

NOTE: This session will be held in the Nova Scotian Hotel.

9.00—Symposium on Poliomyelitis:

Dr. J. T. Phair, Chief Medical Officer of Health, Province of Ontario.

Dr. Alan Brown, Hospital for Sick Children, Toronto.

Dr. D. E. Robertson, Hospital for Sick Children, Toronto.

10.15—The Osler Lecture: Osler, The Last Phase and His Influence on Medicine—Sir Humphrey Rolleston, Surrey, England.

11.00—Surgical Clinic on Cancer:

Dr. M. R. MacCharles, Winnipeg.

Dr. William Boyd, Toronto.

WEDNESDAY AFTERNOON, JUNE 22nd

2.30 p.m.—*General Session, Canadian Public Health Association and the Nova Scotia Health Officers Association.* (Lord Nelson Hotel.)

Chairman—Dr. P. S. Campbell.

Symposium on Tuberculosis

Correlation of Clinical and Public Health Aspects of Tuberculosis—Dr. C. J. W. Beckwith, Divisional Medical Health Officer, Department of Public Health of Nova Scotia, Sydney.

Progress in Tuberculosis Control in Nova Scotia—Dr. J. J. MacRitchie, Divisional Medical Health Officer, Department of Public Health of Nova Scotia, Halifax.

Public Health Aspects of Tuberculosis—Dr. B. C. Keeping, Deputy Minister of Health, and Dr. P. Creelman, Department of Public Health, Charlottetown, P.E.I.

The Tuberculosis-Control Program in Manitoba—Dr. C. E. Donovan, Department of Health and Public Welfare of Manitoba, Winnipeg.

Advances in Tuberculosis Control in Ontario—Dr. G. C. Brink, Director, Division of Tuberculosis Prevention, Department of Health of Ontario, Toronto.

Some National Aspects of Tuberculosis Control in Canada—Dr. G. J. Werhertt, Executive Secretary, Canadian Tuberculosis Association, Ottawa.

Reports of the Committees on Nominations and Resolutions.

Experimental Infection with *H. pertussis* and Protection Tests in Mice¹

NELLES SILVERTHORNE, M.B.

Toronto

IN 1933, Miller (1) showed that mice could be regularly killed with meningococci suspended in hog's gastric mucin. Rake (2), in 1935, applied this method for testing the virulence of strains of meningococci. The following communication records the results of injecting strains of *H. pertussis*, suspended in mucin, intraperitoneally into mice. By the inoculation of mice with freshly isolated strains of *H. pertussis* suspended in mucin, a series of pertussis vaccines purchased on the market was tested for their protective value.

EXPERIMENTAL

Four strains of *H. pertussis* were selected at random from our collection of recently isolated strains, preserved by drying in hard glass tubes and sealed under vacuum. Twelve to fifteen slopes of Bordet medium (glycerin-potato-agar with added citrated sheep's blood, 33 per cent.) were planted with each of the selected strains. Growth from these strains was used from the fourth to the twelfth subculture following original isolation. After 48 hours' incubation at 37° C. the growth on the slopes was carefully scraped off to avoid the inclusion of medium and suspended in 4 cc. of normal saline. From this heavy suspension, suspensions of various densities were made using a Gates turbidometer (3). It was found, after preliminary trial, that a density of 0.7 in normal saline was suitable as a standard initial suspension. From this standard a 1 in 10 dilution was made in 5 per cent. hog's gastric mucin.² Mice were then injected intraperitoneally with 1 cc. amounts of this dilution in mucin. After 48 hours, 86 to 100 per cent. of animals died and heart's blood cultures were positive in a high percentage of those cultured. The same dose suspended in plain beef infusion broth in place of mucin killed approximately 17 per cent. of animals. A stock strain subcultured for years on media devoid of fresh blood was found on no occasion to be lethal for mice. A total of 260 mice has been inoculated with freshly isolated strains of *H. pertussis* suspended in mucin. Of these, 225 died, a mortality of 86 per cent. The four strains tested have been virulent as gauged by this mouse-mucin test.

It is apparent from these results that such a test might serve, not only as a method of testing the virulence of strains, but also as a convenient lethal test to

¹From the Connaught Laboratories, University of Toronto, under the direction of Professor J. G. FitzGerald, and from the wards and laboratories of the Hospital for Sick Children and the Department of Paediatrics, University of Toronto, under the direction of Alan Brown, M.D., F.R.C.P.(C.).

²The mucin was obtained from Wilson Laboratories, Chicago, special granular mucin No. 1701 W. Each batch was tested on a known virulent strain of the meningococcus and consistent results obtained.

demonstrate protection of mice previously inoculated with various pertussis vaccines and "antigens".

Groups of ten mice were inoculated with various pertussis vaccines and "antigens". The mice were injected subcutaneously with the following doses of the products to be tested: 0.25 cc., 0.25 cc., 0.5 cc., and 0.5 cc. at five-day intervals, with a rest period of two weeks, followed by a final dose of 0.5 cc. Two weeks later the mice received 1 cc. of a suspension of a freshly isolated strain of *H. pertussis* in mucin. The results are shown in table I.

TABLE I
PROTECTIVE EFFECT OF CERTAIN PERTUSSIS VACCINES AND "ANTIGENS"

| Product | Mortality Rate | Survival Rate |
|---|----------------|---------------|
| 1. Control (unvaccinated) | 90-100% | |
| 2. <i>H. influenzae</i> vaccine | 90-100% | |
| 3. <i>H. pertussis</i> antigen | 100% | |
| 4. <i>H. pertussis</i> antigen | 100% | |
| 5. Stock-strain pertussis vaccine | 100% | |
| 6. C—Fresh-strain pertussis vaccine | | 100% |
| 7. P—Fresh-strain pertussis vaccine | | 100% |
| 8. L—Fresh-strain pertussis vaccine | | 100% |
| 9. O—Fresh-strain pertussis vaccine | | 100% |

It will be observed that 90 to 100 per cent. of unvaccinated mice died when inoculated with a culture of *H. pertussis* suspended in mucin. Similarly 90 to 100 per cent. of mice vaccinated with *H. influenzae* vaccine, with certain preparations of pertussis antigens and with an old stock-strain pertussis vaccine, died after subsequently inoculating them with living cultures of freshly isolated strains of *H. pertussis* suspended in mucin. It is apparent that the antigens (2-5 inclusive, table I) afforded no protection in mice. In contrast, 100 per cent. of the mice previously vaccinated with vaccines prepared from freshly isolated strains survived. This test offers, therefore, promise of being of use in determining the protective value of pertussis vaccines.

SUMMARY

1. By the inoculation of mice with freshly isolated strains of *H. pertussis* suspended in mucin, a fatal septicaemia may be induced in more than 80 per cent. of the inoculated mice.

2. Pertussis vaccines used in the prevention and treatment of whooping cough may be tested for their protective value by inoculating previously vaccinated mice with freshly isolated strains of *H. pertussis* suspended in mucin.

ACKNOWLEDGMENT

The author wishes to acknowledge the continued interest and advice of Dr. Donald Fraser in this work.

REFERENCES

1. Miller, C. P.: Science, 1933, 78: 340.
2. Rake, G.: J. Exper. Med., 1935, 61: 545.
3. Gates, F. L.: J. Exper. Med., 1920, 31: 105.

CONFERENCE

SECTION OF VITAL STATISTICS AND EPIDEMIOLOGY

CANADIAN PUBLIC HEALTH ASSOCIATION

CHATEAU LAURIER, OTTAWA, THURSDAY, JUNE 16, 1938

Sessions at 9.30 a.m. and 2.30 p.m.

THE undertakings of several of the sections of the Association, notably Laboratory Section and the Section of Vital Statistics and Epidemiology, have become so extended that special meetings of these sections have become essential. To permit of the discussion of the reports of the various committees of the Section, and consultation with the Department of Pensions and National Health and the Dominion Bureau of Statistics, the Section of Vital Statistics and Epidemiology is convening a conference in Ottawa on Thursday, June 16th, at the Chateau Laurier. The findings of the conference will be presented in the reports to the annual meeting of the Association which will be held in Halifax the following week.

PROGRAM

Some Observations on the Recorded Mortality from Goitre

Dr. J. WYLLIE, Department of Preventive Medicine, Queen's University, Kingston.

Report on the Re-allocation of Certificates

Mr. W. R. TRACEY, B.A., Chief, Vital Statistics, Dominion Bureau of Statistics, Ottawa.

Report of the Committee on Accident Prevention

Dr. N. L. BURNETTE, Ottawa.

Report of the Committee on the Classification and Registration of Stillbirths

Dr. A. H. SELLERS, Medical Statistician, Department of Health of Ontario, Toronto.

The Canadian Life Table

Mr. NATHAN KEYFITZ, Dominion Bureau of Statistics, Ottawa.

The Confidential Death Certificate

Dr. PAUL PARROT, Demographer, Ministry of Health, Province of Quebec.

Reporting of Poliomyelitis Cases

Dr. A. R. FOLEY, Dr.P.H., Epidemiologist, Ministry of Health, Province of Quebec.

Report of the Committee on the Certification of Causes of Death

Dr. R. D. DEFRIES, School of Hygiene, University of Toronto.

A Survey of Rocky Mountain Spotted Fever and Rodent Plague

Dr. R. B. JENKINS, Chief, Division of Epidemiology, Department of Pensions and National Health, Ottawa.

Report of the Committee of the Dominion Council of Health on the Classification of the Causes of Morbidity

Dr. R. D. DEFRIES.

Election of Officers.

LUNCHEON, 1 P.M.

Chairman—Dr. L. A. Pequegnat, Deputy Medical Officer of Health, Toronto.

Speaker—Dr. R. H. Coats, Dominion Statistician, Ottawa.

Brucellosis in and around Vancouver*

C. E. DOLMAN AND VIVIENNE G. HUDSON

*Division of Laboratories, Provincial Board of Health
Vancouver, B.C.*

THE veterinarians and dairy farmers of the lower mainland of British Columbia concur in acknowledging that bovine contagious abortion is very prevalent throughout the Fraser River valley, the sole source of the fluid milk supply for Vancouver and the neighbouring municipalities. Unfortunately no authoritative surveys of the incidence of the disease among local herds have been recorded, nor is it possible to state whether the situation is improving or otherwise. But the stringent regulations enforced at the international border, whereby Bang reactors (or cattle showing blood serum agglutinins against a *Brucella* suspension) are forbidden entry into the western States, must tend to an accumulation of infected cattle on this side of the border.

In view of this situation, and of the then apparently increasing percentage of raw milk distributed in Vancouver, a survey was begun two years ago in this laboratory of the *Brucella* agglutinin titre of the whey in raw milk samples brought in by sanitary inspectors for bacterial plate counts. Moreover, for the past six years, all blood specimens sent to the Provincial Board of Health Laboratories in Vancouver for Widal tests have been examined for the presence of *Brucella* agglutinins. In this communication the results of these two surveys will be recorded and their significance discussed and illustrated by reference to the main clinical, aetiological, and bacteriological features of a group of 15 recent cases of severe undulant fever occurring in or near Vancouver.

Jordan (1), Johns, Campbell, and Tennant (2), Hall and Learmouth (3), and others have reported their laboratory and clinical findings among relatively small groups of institutionalized patients known to have been exposed to a *Brucella*-infected milk supply. But we have found no record of any investigation in Canada comparable, in respect of the numbers and types of specimens involved, to that which forms the subject of this report.

Brucella Agglutinins in Whey from Raw-Milk Samples

In partial fulfilment of the regulations governing the bacterial standards of raw milk purveyed within the city, the Provincial Laboratories perform the coli-aerogenes test, and total colony counts, on samples secured by sanitary inspectors at least once monthly from each of the 55 licensed raw-milk distributors in Vancouver. A portion of every sample thus received has been treated with rennet according to Torrey's method (after the cream layer formed on overnight standing has been pipetted off) and the *Brucella* agglutinin titre of the whey determined as follows:

*Presented at the sixth annual Christmas meeting of the Laboratory Section, Canadian Public Health Association, Toronto, December 20-22, 1937.

The antigen used was an 0.5 per cent. phenolized saline suspension (standardized to the equivalent of MacFarland No. 2) of four strains of *Br. abortus*, one strain of which came several years ago from the Ontario Department of Health Laboratories, while the other three were obtained from Dr. Huddleson about two years ago. All four strains had become adapted to growth in ordinary atmospheres on Huddleson's liver infusion agar, but conformed in all other respects, including their susceptibility to various aniline dyes, to the generally accepted criteria for *Br. abortus*. Suspensions prepared therefrom showed no tendency to non-specific agglutination. A semi-dilution series of 0.5 cc. volumes of whey, extending over a range from 1:12.5 to 1:100, was distributed into agglutination tubes. To each tube 0.5 cc. of antigen was added, thus giving a range from 1:25 to 1:200 of whey in the final mixtures. Tubes were incubated at 37° C. for 48 hours, and read after standing an additional 24 hours at room temperature. No inhibitory zones were noted in this survey of whey agglutinins. Readings were classified as follows:

| | |
|---|----------|
| i. No agglutination, or only slight, in 1:25..... | Negative |
| ii. Partial agglutination in 1:25, with slight agglutination up to 1:50..... | Doubtful |
| iii. Complete agglutination in 1:25 only..... | + |
| iv. Complete agglutination up to 1:50..... | ++ |
| v. Complete agglutination up to 1:100..... | +++ |
| vi. Complete agglutination to 1:200 or over..... | ++++ |

From March, 1936, to March, 1938, inclusive, a total of 1,296 separate raw milk samples was received and examined for *Brucella* agglutinins by the method described. Of this total, 704 samples (54.3 per cent.) showed complete agglutination in one more tubes of the range adopted; while a further 168 (13 per cent.) gave a doubtful reading. Thus less than 33 per cent. of samples were completely negative for *Brucella* agglutinins. Submitting results on the 704 positive samples to further analysis, 186 (26.4 per cent. of the positive group) gave a + readings; 275 (39.0 per cent.) gave ++; 173 (24.6 per cent.) gave +++; and 70 (10 per cent.) gave ++++ readings.

When the results are analyzed according to dairies, they assume a yet more serious potential significance. In table I the raw milk dairies of Vancouver have been classified in three categories according to the types of result given by their respective samples. Category 1 includes 9 dairies, among whose 213 samples no negative specimen was found. Category 3, on the other hand, covering dairies which yielded no positive specimens, includes only 60 samples from 3 dairies.* Category 2, into which fell roughly four-fifths of the dairies and their specimens, shows a great preponderance of positive and doubtful results.

We would emphasize that the foregoing findings relate to bottled milk samples, taken as sold, and therefore containing the pooled milk of several cows. In a few instances we have had the opportunity of determining the effect of pooling upon the agglutinin titre of the composite sample.

For example, among 21 samples of bottled milk received at monthly intervals from dairy A, Vancouver, the result was never negative; was doubtful on three occasions; + on six occasions; ++ on eleven occasions; and +++ once. On no occasion was a ++++ reading (complete agglutination in 1:200 or over) obtained. However, when an opportunity

*Ironically enough, the only two dairies whose samples were consistently negative for *Brucella* agglutinins went out of business a few months ago.

came to examine milk samples from 29 individual cows in this dairy's herd, the findings were as follows: nineteen samples gave a negative result; four samples gave a + result; one gave a ++; one gave a +++; and four samples gave a ++++ result. Among this last group of four, the limiting titre proved to be 1:200 in one sample, 1:400 in another, and 1:800 in the two remaining samples. From each of the two latter samples, *Br. abortus* was isolated on Huddleson's liver-infusion gentian-violet agar (4).

TABLE I
BRUCELLA AGGLUTININS IN RAW-MILK SAMPLES FROM DAIRIES DISTRIBUTING IN
VANCOUVER (MARCH 1936-MARCH 1937)

| Category | No. of Dairies | Total No. of Tests | Positive | Doubtful | Negative |
|----------|-------------------|-----------------------|----------|----------|----------|
| 1. | 9 | 213 | 203 | 10 | 0 |
| 2. | 43 | 1,023 | 501 | 157 | 365 |
| 3. | 3 | 60 | 0 | 1 | 59 |
| TOTALS | 55 | 1,296 | 704 | 168 | 424 |

Neg. = no agglutination, or only slight, in 1:25 whey
 + = complete agglutination in 1:25.
 ++ = complete agglutination in 1:50.

D. = partial agglutination in 1:25, with slight in 1:50.
 +++ = complete agglutination in 1:100.
 ++++ = complete agglutination in 1:200.

The agglutination reactions given by the monthly pooled samples from each dairy are listed on charts in the laboratory. Not infrequently, these charts have shown a sudden marked change in the whey agglutinin titre of a given herd. Such changes, as is evident from the following examples, may be of considerable public health significance.

TABLE II
INFLUENCE OF ONE INFECTED COW UPON AGGLUTINATION REACTIONS OF POOLED
MILK SAMPLES

| Dates of tests on pooled samples | Total No. of monthly tests | ++++ | +++ | ++ | + | D. | Neg. | Comments |
|--|-------------------------------|------|-----|----|---|----|------|---|
| Mar. 1936- Jan. 1937 | 11 | 3 | 3 | 2 | 0 | 0 | 0 | |
| Feb. 1937- Aug. 1937 | 7 | 0 | 0 | 0 | 0 | 2 | 5 | Cow "X" removed from herd early in February |
| Sept. 1937- Nov. 1937 | 3 | 0 | 1 | 2 | 0 | 0 | 0 | Cow "X" returned to herd early in September |

Neg. = no agglutination, or only slight, in 1:25 whey
 + = complete agglutination in 1:25.
 ++ = complete agglutination in 1:50.

D. = partial agglutination in 1:25, with slight in 1:50.
 +++ = complete agglutination in 1:100.
 ++++ = complete agglutination in 1:200.

For example, dairy B, Vancouver, over the five-months' period April-August, 1936, yielded three negative and two doubtful samples of pooled milk. The laboratory findings then suddenly changed. From September, 1936-November, 1937, no negative or doubtful samples were received; but of a total of 14 monthly pooled samples, six gave a + result; six gave a ++; and two gave a +++ result. Three months after our laboratory findings had so markedly changed, patient no. 3 in our series, who received his milk supply from this dairy, fell ill and took to bed. Shortly afterwards we readily isolated *Br. abortus*, not only by blood culture from this patient, but also from a composite milk sample from this dairy. Incidentally the particular sample of milk from which *Br. abortus* was grown,

showed only a ++ agglutination reaction (i.e. complete agglutination up to 1:50 whey dilution).

Dairy C, Vancouver, also provides an instructive example. The herd contained 9 cows. The agglutinin reactions of monthly pooled milk samples are shown in table II. In February, cow X, with a history of previous abortion, being about to calve again, was segregated. In the ensuing seven months, during which the milk from cow X was not included in the pooled milk, herd samples (which had previously been always positive) gave either negative or doubtful reactions. Meanwhile, *Br. abortus* was isolated on four separate monthly occasions from the milk of cow X. The agglutination titre of its colostrum was as high as 1:25,600, and *Br. abortus* was grown therefrom; but the titre of its milk subsequently ranged between 1:800 and 1:1,600 over a period of eight months, irrespective of whether or not *Br. abortus* was isolated. After only one or two successive monthly milk samples had proved negative on culture, cow X was returned to the herd. The inclusion of its milk in the next three pooled samples is clearly shown by their agglutination reactions.

On one occasion, undulant fever in a dairy farmer's wife (patient no. 4 in our series) afforded an opportunity of performing parallel agglutination tests upon the blood serum and whey of individual cows in the herd. The results are shown in table III. With only one exception, the blood serum titres proved higher than those of the corresponding whey specimens. Despite the agglutination titre of the whey being only 1:50, *Br. abortus* was isolated from the milk of cow no. 8.

TABLE III

COMPARISON OF AGGLUTININ TITRES IN BLOOD SERUM AND IN WHEY FROM
INDIVIDUAL COWS OF AN INFECTED HERD
(Dairy C., Abbotsford)

| Cow No. | Blood serum: agglutination complete to | Whey: agglutination complete to |
|---------------|---|------------------------------------|
| 4 | 1:100 | Negative |
| 5 | 1:1600 | Specimen unsatisfactory |
| 6 | 1:5000 | 1:200 |
| 8 | 1:1200 | 1:50* |
| 9 | 1:50 | Negative |
| 10 | 1:400 | 1:500 |
| 11 | 1:200 | 1:200 |
| 12 | 1:25 | Negative |
| 13 | 1:200 | Negative |
| 17 | 1:400 | 1:200 |
| 1-3, 7, 14-16 | Negative | Negative |

Negative — no agglutination detectable in 1:25 dilution.

*N.B. — *Br. abortus* isolated from milk of cow no. 8.

Brucella Agglutinins in Human Blood Serum Samples

Blood serum samples sent to these laboratories for Widal tests during the past six years from some 5,420 persons have been routinely tested for *Brucella* agglutinins. The results obtained with one group of 5,068 specimens, sent in by physicians of Vancouver and adjacent municipalities, are set forth in table IV.

In connection with these results, a minor complication arises from the fact that lack of facilities prevented, until August, 1936, replacement of the rapid microscopic method of performing the *Brucella* agglutination test by the more satisfactory macroscopic method

similar to that already described for the whey test. Complete macroscopic agglutination in a serum dilution of 1:20 or higher was thereafter termed a positive result, whereas previously definite microscopic agglutination in a serum dilution of 1:120 or higher had been reported as positive. A series of parallel titrations on a number of specimens verified the general validity of adopting a 6:1 ratio of sensitivity as between the two methods; but the microscopic method proved rather inconsistent, and often gave titres more nearly approximating those obtained on the same specimen by the macroscopic method.

TABLE IV
BRUCELLA AGGLUTININS IN HUMAN BLOOD SERA FROM RESIDENTS OF VANCOUVER
AND ADJACENT DISTRICTS

| Year | Total nos. of specimens tested | Nos. positive for Brucella agglutinins | Per cent. positive for Brucella agglutinins |
|-------|--------------------------------|--|---|
| 1932 | 376 | 10 | 2.7 |
| 1933 | 427 | 11 | 2.5 |
| 1934 | 428 | 18 | 4.2 |
| 1935 | 725 | 66 | 9.1 |
| 1936 | 1,209 | 41 | 3.4 |
| 1937 | 1,538 | 68 | 4.4 |
| 1938 | (3 mo.) 365 | 14 | 3.8 |
| TOTAL | 5,068 | 228 | 4.5 |

To Aug. 1936, positive = definite microscopic agglutination to 1:120 dilution of serum or higher.

Subsequently, positive = complete macroscopic agglutination to 1:20 dilution of serum or higher.

Over the whole six-year period, the incidence of positive samples among a total of over 5,000 sera tested, was 4.5 per cent. Very few of these specimens were sent in under a provisional diagnosis of brucellosis, and we have no information regarding the clinical signs and symptoms from which the majority of the 228 persons with positive sera may have been suffering. However, the further analysis of their limiting agglutination titres, made in table V, suggests

TABLE V
LIMITING BRUCELLA AGGLUTININ TITRES OF 228 POSITIVE HUMAN SERA

| Titre limits for complete macroscopic agglutinations | No. of specimens positive |
|--|---------------------------|
| 1:20 or higher | 228 |
| 1:40 " " | 147 |
| 1:80 " " | 101 |
| 1:200 " " | 64 |
| 1:500 " " | 48 |
| 1:1,000 " " | 42 |
| 1:2,000 " " | 21 |
| 1:5,000 " " | 7 |
| 1:10,000 " " | 3 |
| 1:20,000 " " | 1 |

Note: Where a microscopic test was actually done on the specimen, the titre then shown by the serum has been divided by six, to ensure a conservative macroscopic equivalent being assigned to it (cf. text).

that about 42 of this group probably had an acute attack of brucellosis at the time; while at least 64 must have had a fairly recent attack of brucellosis.

Of the group of 5,068 specimens, over 90 per cent. are known to have come from patients living in or immediately adjacent to Vancouver. The results shown by this group may be contrasted with those given by a group of 352 specimens received from employees of a logging camp, and from residents of a paper-pulp-company town, living remote from Vancouver and its milk supply. In this group, only 2 specimens, or 0.57 per cent., were positive, and gave complete agglutination in serum dilutions no higher than 1:40 and 1:80 respectively. Although there is admittedly a marked difference in the size of the two groups of sera under consideration, the smaller group includes a sufficiently large number for the contrast in findings to be deemed statistically significant. The incidence of *Brucella* agglutinins in the sera of the Vancouver group is roughly eight-fold that in the other group.

ACUTE BRUCellosis ATTRIBUTABLE TO RAW-MILK CONSUMPTION

No attempt was made to trace the clinical history of every patient with a positive serum in the above groups, but in recent months we have telephoned to all city physicians sending in specimens which gave complete agglutination in serum dilutions of 1:1,000 or higher. With the ready co-operation of the physicians concerned, fifteen cases of undoubted acute brucellosis have thus been diagnosed on both laboratory and clinical grounds. In every case, the evidence has pointed to raw-milk consumption as the primary aetiological factor.

Clinical Findings

The characteristic symptomatology of acute brucellosis has been too well recorded in the literature to need further elaboration. But a striking uniformity of clinical signs and symptoms was shown by our group, despite the age range being from 14 to 66 years. Eleven patients were male and four female. General weakness and depression, with fever lasting from several days to a few weeks at a level of 103° F. or even higher, and associated with drenching night sweats, muscle and joint pains, and headache, were typical of the onset. Six patients in the group had an acute sore throat in the early stages of the disease, and in this connection it is of interest to note that Poelma and Pickens (5), and Carpenter and Boak (6) reported the isolation of *Br. abortus* from tonsils. A leucopenia (total W.B.C. 4,000 to 6,000 per cmm.), with a relative lymphocytosis (38 to 63 per cent.), was present throughout the acute phase of the disease in every patient tested. Splenic enlargement was not a conspicuous feature, but a big loss in weight was characteristic. Three of the now convalescent patients show respectively the following neurological or psychological sequelae: partial deafness and ataxia; intermittent paralysis of an arm with migraine-like headaches; and marked emotional depression. In almost every case the original diagnosis was influenza. In four of the patients, this diagnosis was subsequently changed to rheumatic fever, septic arthritis, paratyphoid fever and appendicitis,

respectively. When the fever persisted, or returned after a brief remission, the diagnosis for the rest of the group was changed to pyrexia of unknown origin. In only one instance had the doctor either enquired into the milk supply, or made a provisional diagnosis of undulant fever, prior to our laboratory reports on the *Brucella* agglutinin titre of the patient's serum.

Aetiology

Every one of the foregoing patients had regularly consumed raw milk prior to the onset of illness. Except for three persons, who contracted their infection

TABLE VI
LABORATORY FINDINGS IN 15 HUMAN CASES OF ACUTE BRUCELLOSIS

| Patient No. | Age | Sex | Agglutination Titre of first specimen received | Results of Blood Culture | COMMENTS |
|-------------|-----|-----|--|---|---|
| 1 | 17 | M. | 1:10,000 | 4 positive specimens at 2, 5, 8 and 12 weeks* | Drank raw milk for 9 months prior to onset. Fair recovery with neurological complications after six months' illness. |
| 2 | 38 | F. | 1:2500 | 2 positive specimens at 1 and 3 weeks | Drank raw milk for seven months prior to onset. Good recovery after 7 months' illness. |
| 3 | 55 | M. | 1:500 | 4 positive specimens: concurrently and at 4, 9 and 18 weeks | <i>Br. abortus</i> isolated from his milk supply. Unable to work for 1 year. Poor recovery. Ataxic and deaf. |
| 4 | 40 | F. | 1:2000 | One negative specimen at 1 week | Dairy farmer's wife. <i>Br. abortus</i> isolated from her milk supply. Incapacitated for several weeks. |
| 5 | 17 | M. | 1:1200 | 6 positive specimens: concurrently, and at 1, 3, 7, 26 and 41 weeks | Very serious case with several relapses. Temperature continuously over 104° for 10 days at one period. Now getting better after 1 year's illness. Supplied with "preferred raw" milk by a dairy of high repute. |
| 6 | 28 | M. | 1:4800 | 4 negative specimens at 1, 2, 7 and 38 weeks | Moderately ill and unable to work for several months. |
| 7 | 59 | M. | 1:2000 | One positive specimen at 4 days | Not yet recovered. Ill 13 weeks to date. Keeps own cows. |
| 8 | 55 | F. | 1:2000 | 2 negative specimens: concurrently and at 6 weeks | Not yet recovered. Ill 6 weeks to date. Supplied with raw milk from patient No. 7's cows. |
| 9 | 27 | M. | 1:2000 | 1 negative specimen at 7 weeks | Not yet recovered but now ambulatory. Ill 12 weeks. |
| 10 | 14 | F. | 1:1600 | No specimen obtained | Had relapse after 1 year interval. At first attack had generalized rash and acute sore throat. |
| 11 | 44 | M. | 1:3200 | 1 negative specimen at 4 days | Keeps own cows. |
| 12 | 30 | M. | 1:2560 | 2 positive specimens at 5 days and 1 week | Policeman. Suffered with sweats on night duty. Finally had to report sick. |
| 13 | 66 | M. | 1:6400 | 1 positive specimen at 1 week | Supplied with "preferred raw" milk by same dairy as case No. 5. Ill 10 weeks. |
| 14 | 45 | M. | 1:2560 | 1 positive specimen at 4 weeks | <i>Br. abortus</i> isolated twice from his milk supply. (Bottles purchased over shop counter.) |
| 15 | 20 | M. | 1:3200 | 2 positive specimens: concurrently and at 2 weeks. | Ill several weeks. At present free from symptoms. |

*Times given represent intervals after the first agglutination test indicated correct diagnosis.

outside this city, all in the group obtained milk from dairies distributing in Vancouver. None of the patients had any concern with the slaughtering of cattle or hogs, although two kept their own cows, and another was a dairy farmer's wife. Our laboratory charts showed the dairies supplying these patients to have poor records in respect of the *Brucella* agglutinin titres of pooled whey samples. Moreover *Br. abortus* was isolated from the milk supplies of three of these patients.

In one instance (case no. 14, table VI) the micro-organism isolated from the patient's blood grew initially in air without added carbon dioxide. No other strain isolated by us from milk, or by blood culture, has grown in atmospheric air except after repeated sub-culture on artificial media. Except for this peculiarity, the strain in question conformed (in respect of its reactions to basic fuchsin, pyronin, and thionin) to the accepted criteria for *Br. abortus* rather than *Br. suis*. Morphologically and serologically, the strain fell definitely in the *Brucella* group. On two occasions, separated by an interval of several days, a bottle of milk from the dairy which had recently supplied this patient, was purchased over a shop counter. A micro-organism was readily isolated from each sample, having the identical characteristics of the strain isolated from the patient. Apart from the deliberate addition of a *Brucella* culture to previously sterilized milk, and the administration of milk so infected to healthy volunteers, it would be hard to secure a more convincing item of epidemiological evidence than this.

Bacteriological Findings

In several of these cases, both patient and physician were so co-operative that repeated blood cultures could be made during the course of the disease. In six patients, *Br. abortus* was readily isolated (using the currently-approved techniques) from two or more successive blood specimens taken at irregular intervals. In three other cases, a positive culture was obtained from the single blood specimen received. One moderately ill patient, from whom four blood samples were obtained, gave negative cultures on each occasion. Four other acute cases, from each of whom only one blood sample was obtained, gave a negative culture, although their *Brucella* agglutinin titres were high. No blood sample was obtained from the one remaining patient. The laboratory findings and commentary notes on these patients are set forth in table VI.

DISCUSSION

The purpose of this paper has neither been to record special cultural and diagnostic methods, nor to report observations throwing new light upon the aetiology of brucellosis in man. Our intention has rather been to show how, within the serious limitations of its working conditions, a public health laboratory can accumulate data bearing significantly upon the relationship of an infected milk supply to the incidence of brucellosis in the community. According to the latest official estimate (7), 78 per cent. of the milk distributed in Vancouver is pasteurized; but that 22 per cent. of the milk should be consumed raw was believed likely to occasion a high incidence of human brucellosis, in view of the local prevalence of contagious bovine abortion.

That local raw-milk consumers undergo no small risk of contracting

Brucella infection is evident from the results of the specific agglutinin survey, carried out on the whey from monthly pooled-milk samples received from the 55 raw milk distributors in the city. In view of the difficulties anticipated in the isolation of *Br. abortus* from pooled milk, and of the fact that the micro-organism is in any event probably excreted intermittently by infected cows, no special efforts were made to determine the frequency with which the actual presence of living Brucella might be demonstrated in these milk samples. But when some unusual circumstance occasioned the attempt, *Br. abortus* was readily isolated from the milk of 6 dairies, of which 4 were city distributors. Culturally positive samples were obtained in two instances from milk showing complete agglutination in no higher than a 1:50 dilution of whey; while we have recently isolated *Br. abortus* from a local raw milk sample giving incomplete specific agglutination in a whey dilution of 1:25. Veterinarians are now learning to be suspicious of cattle showing Brucella agglutinins in a 1:25 dilution of blood serum; and our own findings on one small herd (table III) confirm the view generally held, that the Brucella-agglutinin titre of a cow's blood serum is usually higher than that of its milk serum. Hence, a whey agglutinin titre of only 1:25 is believed to be significant as an index of the possible presence of living *Br. abortus* in the milk: particularly when (as occurs with a pooled sample) a large dilution factor may mask the inclusion of milk from one or more severely infected cows in the sample. There would appear to be no immunological principle to prevent secretion of *Br. abortus* in milk having an agglutinin titre of less than 1:25, but none of the recorded cases of acute brucellosis was supplied with milk by any of the group of 3 dairies (table I) from which agglutinin-positive pooled milk samples had never been obtained.

In surveying the Brucella-agglutinin titres of human blood sera, we were not attempting to determine trends of incidence of brucellosis. We cannot, for instance, explain the especially high percentage of positive samples in 1935. The emphasis should rather be laid upon the finding, in one group, of 4.5 per cent. of positive sera over the whole six-year period, among a total of over 5,000 specimens tested. The choice of a 1:20 dilution of serum giving complete agglutination, may be questioned as a valid criterion of positivity. This dilution was arbitrarily chosen, and no claim is made that positivity (complete agglutination) at this dilution level necessarily indicates past or present Brucella infection. Before any such claim could be considered, the effect of continued ingestion of pasteurized milk containing large doses of dead *Br. abortus* upon the development of specific serum agglutinins, would clearly first need to be determined. Admittedly, neither experimental evidence nor clinical information is available to indicate what percentage of the 228 persons whose specific agglutinin titre we have termed positive, actually suffered past or present disability from Brucella infection. However, the fact remains that whereas only 0.57 per cent. of positive serum specimens were found among a group of persons living remote from Vancouver and its milk supply, the incidence of positive serum specimens was eight times as high among a large group of Vancouver

residents who visited their physicians for one reason or another. The conclusion seems inescapable that the Vancouver group had been more exposed to *Brucella agglutinogens* than had the other group. Moreover, since the Vancouver specimens came from persons who had sought medical attention, it would seem justifiable to presume that the symptoms, in many at least of the 4.5 per cent. of persons showing *Brucella agglutinins*, were attributable to brucellosis. This presumption is strongly supported by the identification of 15 typical cases of acute brucellosis among persons drinking the local raw milk. Since such acute cases are as a rule more readily diagnosed than the subacute and chronic types of brucellosis, the clinically milder varieties of the disease were probably not identified. It may relevantly be stated that any community exposed to a raw milk supply from *Brucella*-infected herds, is likely to suffer a high incidence of vague illness, characterised by persistent slight fevers, recurrent headaches, neurasthenia, and rheumatic pains. Increased use of the intradermal (brucel-lergin) and phagocytic (opsono-cytophagic) tests for *Brucella* infection, as recommended by Huddleson (8), should lead to a specific diagnosis being more frequently made in many instances of this type.

The fact that many of the milder cases of brucellosis do not visit a doctor, and that when they do seek medical care their complaints are rarely attributed to this infection, has encouraged the raw-milk interests of Vancouver to minimize, and even to ridicule, the risk of contracting brucellosis by consumption of raw milk from infected herds. But the information herein recorded has already provided the basis for effective counter-propaganda. There has been no contention that the brucellosis hazard is the major argument for compulsory pasteurization of all milk; but we have lost no opportunity of reiterating to practising physicians, health officers, sanitary inspectors, public health nurses, bacteriology students, and welfare groups, that locally this disease has always appeared to be milk-borne. Some of the most effective proponents of pasteurization have proved to be former sufferers from acute brucellosis. Several local raw milk dairies have recently installed a pasteurizing plant, and the loss of former customers who had learned the aetiology of undulant fever from a friend or relative of a patient with this disease, is believed to have played no small part in bringing about this conversion. Finally, it seems pertinent to note that the findings recorded in this paper have undoubtedly helped to accelerate the formulation, by the local medical and health organizations, of resolutions in favour of the compulsory pasteurization of all milk sold in Vancouver.

SUMMARY

Of 1,296 samples of pooled raw milk received at the Provincial Laboratories from 55 dairies distributing in Vancouver, 54.3 per cent. showed complete agglutination of a standardized *Br. abortus* suspension in whey dilutions of 1:25 or higher. Only 2 of the dairies (no longer in business) yielded whey samples which were consistently negative, according to this criterion; while from 9 dairies negative whey samples were never obtained.

The significance of these results is discussed and illustrated by reference to the isolation of *Br. abortus* from 6 local raw milk supplies, and also from the blood of 9 persons with acute brucellosis of apparently milk-borne origin.

Over a six-year period, a *Brucella* agglutinin survey was made, covering one group of 5,068 blood specimens sent in by Vancouver physicians for Widal tests. Of this group, 4.5 per cent. gave a complete agglutination of a *Br. abortus* suspension in a serum dilution of 1:20 or higher. By contrast, among blood specimens from an analogous group of 352 persons living remote from Vancouver, only 0.57 per cent. showed agglutinins in equivalent titre.

The main clinical findings in 15 typical cases of acute brucellosis were protracted fever, loss in weight, joint and muscle pains, headache, and depression. Leucopenia, with a relative lymphocytosis, was present in all cases. The final diagnosis was invariably made as a result of laboratory findings.

ACKNOWLEDGMENTS

We desire to record our appreciation of the kind co-operation received from various physicians whose patients are referred to in this paper; from the sanitary inspectors who have collected the raw milk samples; and from our laboratory colleagues, especially Miss E. M. Allan, who performed the agglutination tests on the human blood sera.

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THE TWENTY-SEVENTH ANNUAL MEETING

THE twenty-seventh annual meeting of the Canadian Public Health Association may well be one of the most important that the Association has held. Surveying the past, certain annual meetings stand out as occasions when policies were determined that are now clearly marked as turning points in the Association's history. The program of the first meeting, held in Montreal in 1912, indicated clearly the conception of the founders of the Association as the national health association in Canada with interests in every field of public health. The meeting in Vancouver in 1920 marked a forward movement in the assumption of responsibilities in child hygiene and the purchase of a controlling interest in the Association's JOURNAL. At the meeting in Montreal in 1928 the purposes of the Association were carefully reviewed and the decision was made that the Association could best serve as the professional society of public health workers. With the hearty approval and co-operation of the provincial departments of health, the Association purchased the JOURNAL and established a series of national committees that have made substantial contributions in various important fields. During all these years the Association has conducted its work without a salaried executive and with the very minimum of office assistance. The Executive Committee is now prepared to present plans to meet the needs. Such plans have been considered in the light of the new responsibilities that the Association has assumed. These include the establishing of qualifications and the certifying of sanitary inspectors throughout Canada, active participation in the movement for full-time rural health services including the holding of an annual Rural Health Conservation Contest, and the work of such national committees as those concerned with safe milk, qualifications for the appointment of medical officers of health and public health nurses, housing in relation to health, and the technical committees in the field of vital statistics and laboratory work. The Halifax meeting will be the occasion when these plans will be considered.

From the program which is published in this issue it is appreciated that the meetings will fulfil in every way their purpose of presenting the recent advances in preventive medicine and the practical experiences of medical officers of health, practising physicians, and others engaged in health work. The meeting will be outstanding, too, because of Maritime hospitality. During the week of June 20th the Canadian Medical Association and the Medical Society of Nova Scotia will hold their meetings also. Thus the week will be a great medical occasion.

PLANS, PROGRAMS, AND PROGRESS

ANNUAL MEETING CANADIAN TUBERCULOSIS ASSOCIATION

THE thirty-eighth annual meeting of the Canadian Tuberculosis Association will be held in the Queen's Hotel, London, on Thursday and Friday, June 9th and 10th. General sessions with the Michigan Trudeau Society and the Ontario Laennec Society will be held on both days. The complete program is as follows:

FRIDAY, JUNE 10th

- 9.30—Registration.
10.00—General Session.
1. Report of After-Care Schemes—DR. R. J. COLLINS, Medical Superintendent, Saint John Tuberculosis Hospital.
 2. A Fourteen-year Study of Tuberculosis Mortality in Nova Scotia—DR. A. L. MCLEAN, Department of Preventive Medicine, Dalhousie University.
 3. Methods and Results of Tuberculosis Case-Findings in the Counties of Lincoln and Welland—DR. C. G. SHAVER, Medical Superintendent, Niagara Peninsula Sanatorium.
 4. Some Observations on the Work of Canadian Sanatoria—DR. G. J. WHERRETT, Executive Secretary, Canadian Tuberculosis Association.
- 12.30—Luncheon—Guest Speaker, DR. HENRY F. VAUGHAN, Commissioner of Health, Detroit; New Adventures in Case-Minding.
- 2.00—1. Classification of Tuberculosis—DR. P. M. ANDRUS, Queen Alexandra Sanatorium.
2. Short Symposium on Indian Tuberculosis:
(a) Report of Survey in Manitoba—DRS. E. L. ROSS and A. L. PAINE, Manitoba Sanatorium.
(b) Progress Report of Qu'Appelle Indian Health Unit—DR. A. B. SIMES, Fort Qu'Appelle.
(c) Pulmonary Tuberculosis in Metis—Results of Sanatorium Treatment—DR. J. D. ADAMSON, Medical Director, St. Boniface Sanatorium.
- 4.00—Garden Party at Queen Alexandra Sanatorium.
Golf.
7.30—Meeting of Executive Council.

SATURDAY, JUNE 11th

- 9.30—1. A Standardized Technique for Sedimentation Estimation—DR. JAMES L. BLAISDELL, Pathologist, Queen Alexandra Sanatorium.
2. Phrenic Nerve Paralysis: Its Place in the Treatment of Pulmonary Tuberculosis—DR. A. F. MILLER, Medical Superintendent, Nova Scotia Sanatorium.
3. Extra Pleural Pneumothorax at the Mountain Sanatorium—DRS. JAMES, AITCHISON and FORSBERG, Hamilton.
4. Review of Five Hundred Cases of Thoracoplasty including Follow-up of the Living to Date—DRS. E. J. O'BRIEN and WM. TUTTLE, Herman Kiefer Hospital, Detroit.
- 2.00—1. Circulation in the Lungs Under Various Types of Collapse Measures—DRS. C. C. BIRKELO and WM. BROSIUS, Herman Kiefer Hospital, Detroit.
2. An Attempt to Evaluate the Respiratory Function by Means of the Douglas Bag—DR. WALLACE WHITEHEAD.
3. Management of the Poor Risk Thoracoplasty—DRS. JOHN ALEXANDER and CAMERON HAIGHT, Ann Arbor, Michigan.
4. Routine Bronchoscopies—Percentage of Positive Findings—Classification of Lesions as Found—DRS. STEELE, LESLIE and MCINDOE, State Sanatorium, Howell, Michigan.
5. Lung Abscess—Review of Methods Used—How Not to Treat Lung Abscess—DRS. SHAW and BLACKMAN, University Hospital, Ann Arbor, Michigan.
- 7.00—Annual Dinner—Canadian Tuberculosis Association.
Guest Speaker—To be announced.

CHRISTMAS SEAL SESSIONS

SATURDAY, JUNE 11th

Sessions at 10 a.m. and 2 p.m.
Luncheon—1 p.m.—Speaker, MISS FRANCES BROPHY, Seal Sale Adviser—National Tuberculosis Association, New York.

CONSIDERATION OF NUTRITION

AT A MEETING in October, 1937, the Dominion Council of Health, the advisory body to the Department of National Health, appointed a Committee on Nutrition under the chairmanship of Dr. J. G. FitzGerald. To

assist this committee there was appointed a Scientific Advisory Committee under the chairmanship of Dr. C. H. Best. In December a Canadian Council of Nutrition was appointed by the Dominion Government. Dr. R. E. Wodehouse, Deputy Minister of Pensions and National Health, was appointed chairman. On this council the Canadian Public Health Association is represented by Dr. J. E. Sylvestre, Director of Nutrition, Ministry of Health of Quebec. The first meeting of the Council was held on April 20th and was preceded by a meeting of the Scientific Advisory Committee. Preliminary to this meeting, a conference was held in Ottawa on February 19th. Professor E. V. McCollum, of the Johns Hopkins University, was the guest of the Committee on that occasion and addressed the Canadian Club at a public meeting in the evening.

QUEBEC CITY HEALTH SURVEY

ANNOUNCEMENT has been made by the Hon. Dr. Paquette, Minister of Health of Quebec, that steps are being taken in co-operation with the city of Quebec to conduct a survey of the health needs of the city. The survey will be made under the direction of Dr. Emile Nadeau, of the Ministry of Health, whose services are being made available to the city of Quebec. A survey committee to be known as the Quebec City Public Health Committee has been appointed, consisting of Dr. Emile Nadeau as chairman, Dr. Edgar Couillard, Dr. Jos. Devarrenes, and Dr. Paul Parrot.

SMALLPOX AT HALIFAX

PROMPT action on the part of the federal, provincial, and municipal authorities prevented a serious outbreak of smallpox following the death, late in March, of a sailor who developed haemorrhagic smallpox shortly after the arrival of his ship at Halifax. Two contact cases occurred in orderlies who attended the deceased. Immediate vaccination of all contacts and the general vaccination of the citizens of

Halifax prevented the spread of the disease. An official enquiry has been conducted by the Department of Pensions and National Health through a board consisting of Professor J. G. Fitzgerald, University of Toronto (chairman), Dr. H. G. Grant, Dalhousie University, and Dr. Alphonse Lessard, Quebec. The board met in Halifax during the week of April 25th.

STATE MEDICINE

THE question of State medicine was brought before the Dominion Parliament on March 6th in a resolution presented by Mr. Daniel McIver of Fort William. Discussion of the resolution occupied all day and was not concluded until the closing hour at eleven p.m. Dr. J. P. Howden of St. Boniface led in the support of the resolution and Dr. H. R. Fleming of Humboldt led the opposition. It was significant that such a large number of members participated in the discussions and that the majority of them were distinctly favourable. State medicine has become an annual topic in Parliament but the views were about as divergent as when the subject was first debated nearly ten years ago. Dr. Howden, who has sponsored several similar resolutions, argued that State medicine would reduce the number of deaths from preventable diseases, would eliminate the uneven distribution of the cost of medical services, and would provide medical services in outlying districts. He believed, further, that it would reduce medical costs and provide to physicians a steady income, removing from the public the fear and burden of large medical and hospital bills. Dr. Fleming opposed the socialization of medical services on the basis of cost and the failure of any system of socialization to achieve its fundamental objectives. The Hon. Mr. Power, Minister of Health, expressed doubt that the people of Canada would agree to medical services directed and controlled by the State. Dr. J. J. McCann, in opposing the resolution, stated that medical science was probably fifty years ahead of the willingness and

financial ability of the people to take advantage of it. He did not believe that the benefits of medicine could be brought to the people by commandeering the medical men into the service of the State.

DIPHTHERIA-TOXOID WEEK IN TORONTO

A HIGHLY successful diphtheria-toxoid week was conducted in Toronto during the week of April 24th under the auspices of the Toronto Diphtheria Committee of the Health League of Canada. Radio talks were given daily, billboard posters were used, literature was distributed in the schools, and considerable publicity was given by the Toronto press to the subject of the prevention of diphtheria. Striking results have been obtained in the control of diphtheria in Toronto. In 1929 there were 1,030 cases reported, and 82 deaths. A systematic program of diphtheria immunization was undertaken in that year and in 1936 there were only 48 cases with 2 deaths. In 1937 there were no deaths but 2 deaths have been reported during 1938, indicating the need for affording protection to every child in the city.

THE FIRST OFFICIAL CANADIAN LIFE TABLES

THE Dominion Bureau of Statistics has done much to raise vital statistics in Canada to its present high standard. The plan of Dominion-Provincial co-operation inaugurated in 1920 to produce nationally uniform vital statistics is a model of achievement. It is of great interest therefore that the Bureau has recently published the first official life tables for Canada, referred to as the Canadian Life Table No. 1 in Census Monograph No. 13. The work was carried out by Mr. Nathan Keyfitz and includes tables for each sex in Canada, the Maritimes, Quebec, Ontario, the Prairie Provinces and British Columbia, based on the census population of 1931 and the recorded deaths for the three years

1930-1932. As well a table has been prepared for the Registration Area as of 1921 for that year and for 1931.

This development is a significant one. There has long been a definite need for a Canadian Life Table, for though usually associated with life insurance, life tables have many other uses, uses which concern sociologists, medical statisticians and others. The data now available will permit the application of the methods of life table analysis in assessing the influence of treatment on morbid processes, for the first time using Canadian data.

In the preface to this monograph Dr. R. H. Coats, Dominion Statistician, observes that Canada shows on the whole a considerably lower mortality than either the United States or England and Wales. It is of interest too that a comparison of the mortality in the Registration Area of 1921 with that for the same area in 1931, shows a definite decline at ages up to 80 years.—A. H. Sellers.

PERSONALS

DR. NORMAN MACL. HARRIS retired on superannuation April 1st from the position of Chief of the Laboratory of Hygiene, Department of Pensions and National Health, Ottawa. His retirement follows seventeen years of service in the Department, having been appointed director of the Laboratory in 1921. Prior to his work in Ottawa, Dr. Harris had had a wide experience in teaching and research in the field of bacteriology and immunity. He served as President of the American Society of Bacteriologists in 1925 and as President of the Canadian Public Health Association in 1929.

DR. DONALD H. WILLIAMS, formerly of the Mayo Clinic, has been appointed medical director of the Division of Venereal Disease Control in the Provincial Board of Health of British Columbia, succeeding Dr. S. C. Peterson, who has resigned to re-enter private practice. Dr. Peterson will retain his association with the division as consulting physician.

